CLINICAL ATLAS OF SECTIONAL AND TOPOGRAPHICAL ANATOMY

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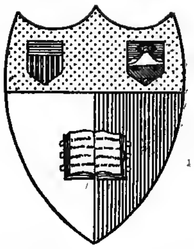

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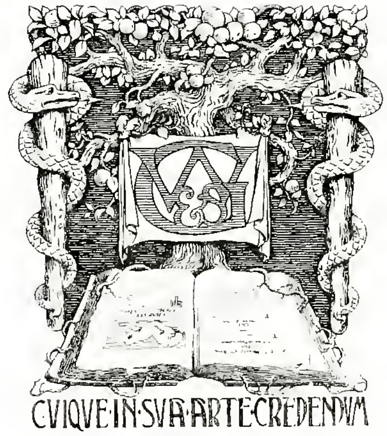

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A CLINICAL ATLAS OF SECTIONAL AND TOPOGRAPHICAL ANATOMY

BY

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TO

MY COLLEAGUES IN THE AUSTRALIAN UNIVERSITIES AND

THE MEDICAL PROFESSION IN VICTORIA

IN GRATEFUL RECOGNITION

A CLINICAL ATLAS OF SECTIONAL AND TOPOGRAPHICAL ANATOMY

Introduction.

In presenting to the medical profession a modern work on the sectional anatomy of the human body, a work designed alike for the practitioner, the specialist, and the anatomist, it may be as well to remind the reader that no similar work has been issued to the medical public since the year 1866, when Wilhelm Braune (1) published his classical work, *Topographisch-Anatomisches Atlas nach Durchschnitten an gefrornen Cadavern,* a work which ran into a second edition in 1875, and which was subsequently translated into English. (2)

Brief History of Sectional Anatomy.

To Eduard Weber, (3) however, must be assigned the credit of placing sectional anatomy on a scientific basis, inasmuch as he was, according to Braune, the first to freeze a body for section cutting in the year 1836.

Weber's methods were subsequently adopted by Pirogoff, (4) Luschka, (5) Le Gendre, (6) Henle, (7) Schmidt, (8) and Volz, (9) and attained their culminating point in the well-known work of Braune, to which reference has just been made.

Since 1866 no comprehensive attempt has been made to cover the whole field of human sectional anatomy, nor is the reason far to seek, for in no other branch of anatomical science is progress more dependent on material than in sectional anatomy, and just so long as the supply of the necessary material remains dependent on conditions outside anatomical control, such as those necessarily imposed by legislation and unnecessarily so by other causes, just so long must the medical profession expect the progress of this most important clinical side of anatomy to remain *in statu quo.* The problem is entirely one of supply and demand. In almost every school of anatomy in almost every part of the world the actual supply of material is inadequate to the everyday demands made upon it by students of anatomy, and hence it comes about that to-day the subject of sectional anatomy in its entirety stands pretty much where it did where Braune left it over forty years ago.

Whilst anatomists have, therefore, for reasons beyond their control, been unable to undertake anything like a systematic survey of the sectional anatomy of the human body, it must not be supposed that the subject has been entirely neglected. In the pages of the many excellent text-books and manuals of anatomy there exist figures of individual sections. Again, the sectional anatomy of particular parts of the body has been, at various times, investigated by competent authorities.

It is quite unnecessary to enter into a critical analysis of the literature of this more limited field of the subject, but as examples there may be mentioned, for the head and neck, the works of Symington (10 and 11) on *Cranio-Cerebral Topography* and *Observations on the Relations of the Deeper Parts of the Brain to the Surface;* Macewen's (12) well-known *Atlas of Head Sections;*

Fraser's (13) *Guide to Operations on the Brain;* Cunningham's (14) *Contribution to the Surface Anatomy of the Cerebral Hemispheres;* Rüdinger's (15) *Topographisch-chirurgische Anatomie des Menschen;* Froriep's (16) *Die Lagebeziehungen zwischen Grosshirn und Schädeldach;* and the more recent work of R. W. Reid, (17) F. W. Müller, (18) Clark, (19) Ergo, (20) and many others.

For the thorax there exist in the text-books many excellent figures of its sectional anatomy, whilst the subject has also been dealt with by Luschka (21) in his *Die Brustorgane des Menschen in ihrer Lage,* and by Berry (22) in his *Transverse Sectional Anatomy of the Thorax.*

For the abdomen there are the classical works already mentioned, the individual figures of the text-books, and a very large literature of general topography. Potter (23) in America has recently published an excellent monograph on the sectional anatomy of the thorax and abdomen, whilst Cunningham (24) has also dealt with the sagittal sectional anatomy of the abdomen.

The sectional anatomy of the pelvis is rich in literature, and includes many valuable contributions by Barbour, (25) Webster, (26) Berry Hart, (27) Braune and Zweifel, (28) Kohlrausch, (29) and many others.

Whilst, therefore, sectional anatomy owes much to the recent labours of specialists in limited fields, the fact remains that since the time of Braune no systematic attempt has been made to cover the whole field of adult sectional anatomy.

That the writer has been able, however inadequately, to endeavour to fill this void is simply due to a fortuitous combination of three essentials, first, a temporary command of an adequate anatomical supply; second, the improved technique of modern anatomical hardening processes; and lastly, the introduction by Addison of a topographical method which is not only highly efficient clinically, but is withal as simple as it is accurate.

Adequate Anatomical Supply.

It has already been stated that the first essential for sectional anatomy is an adequate supply. During the years 1906 to 1909, and notwithstanding that there were on the books of the Practical Anatomy Department of the University of Melbourne some 180 students annually, I was so far fortunate as to command a supply of material slightly in excess of the annual demand. This surplusage was not, in itself, so large as to allow much choice in the way of sex or age, but still it was sufficient for the purpose, and afforded types of both male and female, and an age range from adolescence to advanced old age.

Improved Technique.

Since the time of Braune anatomical science has well nigh been revolutionised by the introduction of formaldehyde as a hardening agent. Braune and his predecessors were entirely dependent on temporary freezing. In the present instance, as will be pointed out later, the subjects were not only frozen, but had been previously thoroughly hardened by long-continued formaldehyde injections, and hence the sections retained their shape and consistency not only during the cutting process, but also during all the subsequent stages of observation.

The mechanical appliances for the actual sectionising of the body are also far in advance of Braune's time. In the present work, for example, all the sections were made by an electrically-driven band saw specially cut with twenty-four teeth to the inch.

For the reproduction of their sections Braune and his predecessors were compelled to resort to tracings, hand drawings and engraved lithographic plates, thus introducing a possible dual source of error. In the present work these possible sources of error are entirely eliminated by the introduction of photography throughout. The plates are, therefore, an exact and faithful representation of the original sections.

Clinically Cut Sections.

The present work differs in one essential feature from every pre-existing work. It has hitherto been customary to cut thoracic or abdominal sections either through quite arbitrary planes or with reference to the vertebral column. Potter's recent work is an example of the former method and Braune's of the latter. Both, however good in themselves, are inadequate for the clinician.

In the present work every section, whether horizontal or sagittal, and every topographical dissection is made neither arbitrarily nor with reference to the vertebral column, but passes through or between certain great clinical planes—planes which can be applied to the living subject by every practitioner within a very few seconds, thus enabling him to obtain an accurate picture of the sectional anatomy of any part of the trunk almost instantaneously. This constitutes, from the clinician's standpoint, a marked and noteworthy advance in sectional anatomy, and for the possibility of its introduction into the present work we are indebted to the admirable researches of Addison (30) in the domain of abdominal topography.

Advantages of Addison's Topographical Method.

Addison, in introducing his now well-known method of thoraco-abdominal topography in 1899, said:—"The method of determining the position of the underlying parts should be as simple as possible, it should be convenient of application, and withal, having regard to the varying conditions of the abdominal organs, as accurate as can be. One seldom meets with an abdomen which can be called normal in all respects. . . . The present methods of abdominal topography, in regard to surface points, leave something to be desired. This is sufficiently evidenced by the diversity of the methods employed amongst anatomical authorities."

"In undertaking this research, therefore, it seemed to promise the greatest utility if certain regular surface-points were taken which would be quite independent in themselves of such movable parts as the costal cartilages or the umbilicus, and which, whilst retaining, as far as may be useful, those parts as adjuncts, would be unvarying, and easily determined in any particular body."

That Addison's method fulfils the conditions which he himself has laid down I can fully confirm. Writing in 1906, after seven years' experience of Addison's method, I stated (32):—

"Some of the more important advantages of Addison's method are that it employs fixed and easily determinable osseous landmarks; that the method, being a simple process of bisection, is easily remembered; that it employs no variable and obscure rib cartilages; that the distances between its transverse planes is relatively constant; that it is adaptable to the living subject, and to diagrams and figures of all scales."

I can only add that each year's additional experience confirms my impression as to the practical value of Addison's method to both the clinician and the anatomist.

Time, usage, and the general adoption of the Basle nomenclature render it impossible now to give the method in Addison's original words, but the description which follows has received his sanction and approval.

Description of Addison's Method.

Four easily determined bony landmarks—the cranial border of the manubrium sterni, the symphysis ossium pubis, and the right and left anterior superior iliac spines—having been located, the trunk is first "divided vertically by three lines, a median line and two lateral lines." (See Plates 16, 32, or 40.)

The *median line* is drawn from the cranial border of the manubrium sterni to the symphysis ossium pubis. Of the three vertical lines employed "the median line is the most useful, both for the equal division of the abdomen and for the purposes of measurement, both vertically and transversely."

The *right and left lateral lines* are drawn vertically, one on each side, through a point half way between the anterior superior iliac spine and the median line, in a line drawn transversely across between the two anterior superior iliac spines. "The method used for determining these lines is more accurate than by taking the mid-point of the lig. inguinale [Poupartii] (Poupart's ligament), for this is a point not easy to determine exactly."

The vertical lines having been thus located, the transverse lines are found by a process of bisection, the body being divided transversely by lines drawn at points a quarter, a half, and three-quarters of the way along the median line. These lines are termed in a cranio-caudal direction:—

The trans-thoracic line.
The trans-pyloric line.
The trans-tubercular line.

The *trans-thoracic line* "passes across the thorax, as a rule 3·2 cm. cranial to the caudal border of the corpus sterni."

The *trans-pyloric line* corresponds "almost accurately to the disc between the first and second lumbar vertebræ, and cuts the junction of the eighth and ninth costal cartilages at the tip of the ninth."

The point of intersection of the trans-pyloric line with the right lateral line marks out the position of the neck of the gall-bladder, the commencement of the pars descendens duodeni (second part of duodenum), and the right kidney just cranial to its hilus.

In the median line the point of intersection is ventral to the stomach and the pancreas.

In the left lateral line the point of intersection cuts the ventral border of the body of the pancreas, and the left kidney just lateral to its hilus.

The *trans-tubercular line* "passes on an average 5 cm. cranial to the anterior superior iliac spine, and 3·5 cm. caudal to the most cranial part of the crista iliaca." Dorsally the plane of the line usually cuts the fifth lumbar vertebra.

By Addison's method the ventral surface of the trunk is divided into four zones of equal depth by means of the trans-thoracic, trans-pyloric, and trans-tubercular lines, each zone being subdivided into four regions of equal size by means of the median and the right and left lateral lines. These zones and regions are as follows:—

The Thoracic Zone.—This zone lies between the trans-manubrium and the trans-thoracic lines, and its four regions are from right to left—

The right infraclavicular-mammary region.
The right sternal region.
The left sternal region.
The left infraclavicular-mammary region.

The Costal Zone.—This zone lies between the trans-thoracic and the trans-pyloric lines, and its four regions are from right to left—

The right hypochrondriac region.
The right epigastric region.
The left epigastric region.
The left hypochondriac region.

The Umbilical Zone.—This zone lies between the trans-pyloric and the trans-tubercular lines, and its four regions are from right to left—

The right lumbar region.
The right umbilical region.
The left umbilical region.
The left lumbar region.

The Hypogastric Zone.—This zone lies between the trans-tubercular line and the trans-symphyseal line, and its four regions are from right to left—

The right iliac region.
The right hypogastric region.
The left hypogastric region.
The left iliac region.

Application of Addison's Method to Sectional Anatomy.

In the present work every section and every topographical dissection is made through or between the several clinical planes of Addison. As a necessary preliminary, therefore, to the sectionising of the cadaver, Addison's lines are drawn upon the ventral surface of the trunk, and a section is then made to pass through every one of the transverse lines, including the trans-manubrium and trans-symphysis lines. A second cadaver, with all the lines similarly drawn in, is employed for the sagittal sections, which are designed to pass through each of the three great clinical vertical planes. In each instance the amount of tissue between both the transverse and the vertical planes was sufficient to allow of intermediate sections being cut between the chief clinical planes.

In the transverse sections, Plates 16 to 31, there are thirteen sections of a uniform thickness of 4 cm., whilst in the sagittal series, Plates 32 to 39, there are seven sections of a uniform thickness of 3 cm.

In the transverse series of sections the correct positions of the right and left lateral and the median lines are projected in a ventro-dorsal direction across the surface of the section; there is also introduced a frontal (coronal) line which accurately bisects the surface of the section and divides it into a ventral and a dorsal half. By means of these four lines the surface of every thoracic and abdominal section is subdivided into eight areas, four on the ventral and four on the dorsal side. The position of every structure visible on the surface of a section can thus be accurately referred to either a line or an area. Further, the exact position of every section with reference to a fixed point—the manubrium sterni—being known from the key plate, the position of any structure can be projected on to the body of the patient by means of the centimetre scales.

As with the transverse sections, so with the sagittal. Across the surface of every sagittal section there are projected the correct positions of the trans-manubrium, trans-thoracic, trans-pyloric, trans-tubercular, and trans-symphysis planes, with a centimetre scale reading caudally from the trans-manubrium plane.

In the topographical series of plates, Plates 40 to 57, Addison's clinical planes, both vertical and transverse, are shown on every plate. To every plate is appended a vertical centimetre scale reading caudally from the trans-manubrium plane, together with a second centimetre scale reading horizontally to right and left from the median plane. By means of these two scales almost any structure visible in any plate can be projected on to the body of the patient, as it suffices to notice the position of the structure in reference to these two scales and then measure them off on the body of the patient.

Addison's method not being applicable to the head and neck, a different procedure is there adopted. The sections are cut at regular intervals of 2 cm. from the vertex caudally. A centimetre scale, reading in a ventro-dorsal direction, is appended to each of the ten sections into which the head is cut.

The three dissections of the dorsal aspect of the trunk, Plates 58 to 60, are made without the employment of either topographical lines or centimetre scales.

Source, Sex, and Age of the Material Employed.

The transverse sections of the head and neck, Plates 1 to 14, are made upon an adult male Australian aboriginal, aged 25 years. This portion of the work was undertaken in conjunction with Dr. J. F. Flashman, formerly Director of the Pathological Department of the Lunacy Board of New South Wales, and was designed with the dual object of ascertaining the topographical relations of the aboriginal brain to the surface, and also for the purposes of the present work. It need hardly be pointed out that although there are undoubted anatomical distinctions of race, yet they are of such a minor character as not to affect the purposes of the present work, whilst the fact of such an excessively rare series of plates being incorporated in this work lends to it an additional scientific interest.

The numerous researches of Elliot Smith, Flashman, and others have proved that the visual area and many of the occipital sulci and cerebral infoldings in the Australian aboriginal brain are of a more primitive character than in the Caucasian, and the present head is no exception. There has, in consequence, been added another plate, Plate 15, where the lateral relations of the cerebral hemisphere are shown on the head of an adult male Caucasian, aged 48.

The transverse sections, Plates 16 to 31, are made upon the body of an adult male Caucasian, aged 74.

The sagittal sections, Plates 32 to 39, are made upon the body of an adult male Caucasian, aged 73. Similar sections were also cut upon the body of an adult Caucasian female, but as the general results, exclusive of the pelvic anatomy, coincided, they have not been incorporated in this work.

The topographical dissections of the thorax and abdomen, Plates 40 to 57, are made upon the body of an adult Caucasian male, aged 54.

The dissections of the dorsal aspect of the trunk, Plates 58 to 60, are made upon the body of an adult Caucasian female, aged 65.

The advanced age of two of the subjects employed leaves, perhaps, something to be desired, but it has already been pointed out that the amount of material available for this work, although sufficient, was not excessive, and in consequence did not allow an extensive choice. On the other hand, surgeons are called upon to operate at all ages, and should therefore be familiar with the anatomical differences induced by advancing age, a fact which makes the varying ages of the subjects of the present work an advantage rather than otherwise.

A much more disturbing factor to the section cutter is the impossibility of forecasting the amount of disease present before cutting the sections. It is true that a cause of death is furnished with the cadaver, but in actual anatomical practice the information to be gleaned therefrom must necessarily be of a negative character as regards the amount of visceral disturbance due to disease. In the present series of cases the subjects are on the whole as free from gross pathological lesions likely to disturb anatomical relations as any dissecting-room subjects could be. It is, however, proper to point out that the subject of the transverse sections was eventually found to have suffered from pleural effusion (Plates 18, 19, and 20) and a cystic condition of the right kidney (Plate 23).

The only other pathological lesion of an important character is the marked right lateral deviation of the uterus seen in Plate 60.

The material employed in the present research may be tabulated as follows:—

Head and neck. Plates 1 to 14. Australian aboriginal male, aged 25.

Plate 15. Caucasian male, aged 48.

Transverse sections of the thorax and abdomen. Plates 16 to 31. Caucasian male, aged 74.

Sagittal sections of the thorax and abdomen. Plates 32 to 39. Caucasian male, aged 73.

Topographical dissections of the thorax and abdomen. Plates 40 to 57. Caucasian male, aged 54.

Dissections of the dorsum of the trunk. Plates 58 to 60. Caucasian female, aged 65.

Sectional Technique.

All the subjects employed in the present investigation were thoroughly hardened by slow and repeated injections of 20 per cent. formaldehyde solutions. The vessel selected for the injection depended on the part to be cut; thus, for the trunk the a. femoralis was most frequently employed; for the head the a. carotis communis; occasionally both vessels were utilised.

Prior to the section cutting the body was frozen in a salt and ice mixture for three to five days, dependent on the part to be cut and the condition of the temperature.

The sections of the head and neck, thorax and abdomen were all cut, as previously stated, by an electrically-driven band saw, with a specially manufactured twenty-four teeth to the inch saw. After cutting, each section was washed in running water and then placed in glycerine jelly; when the glycerine jelly had set, the section practically became a solid block, and all hollow viscera were thereby accurately retained in place. The section was subsequently preserved in a formol solution. The clinical planes of Addison were located by threads securely pinned into position from the surface lines, which were again verified by reference to the divided osseous points.

The topographical dissections of the thorax, abdomen and dorsum were made upon thoroughly formalin-hardened subjects immovably suspended, for reasons to be hereafter mentioned, in a vertical position.

The head and neck sections were made in conjunction with Dr. J. F. Flashman, of Sydney; the remainder were cut by my assistant, Mr. W. H. Preston, and myself. The topographical dissections of the thorax and abdomen were carried out under my supervision by my prosectors, Messrs. Atkinson, Hamilton, Noonan, Parer and Tymms, whilst the three dissections of the dorsum of the trunk were similarly prepared by the prosectors of the following year, Messrs. Anderson, Douglas, Roche, Spargo, Tait and Webster, and have been described in detail elsewhere (31).

Photographic Technique.

The reason why photography was selected as the medium of recording the sections was, as stated, simply due to the fact that it affords the most faithful reflex of the originals, and is altogether free from any intermediate sources of error or of possible idealisation from the pen of the artist.

In the case of the sections, all were photographed under water with a vertically directed and immovably fixed camera. The instrument employed was a "Century Studio Camera" with a long focal lens of the best quality—in fact, both camera and lens were specially selected for the work.

In the photography of the topographical dissections, Plates 40 to 57, some very special precautions were necessary. As one of the objects of this portion of the work was the precise determination of Addison's clinical lines to both superficial and deep structures, it is clear that had either camera or object moved during the manipulation and dissection of the cadaver, the phenomenon known as "parallax" would have ensued, and the results of this part of the work would have been entirely vitiated. To avoid this the body was suspended on a wooden frame, which was screwed down to the floor, with the cadaver immovably fixed to the frame. It is therefore beyond question that the body retained its absolute immovability throughout the whole of the dissectional technique, and it was to insure this immovability that the dissections were carried out in the erect attitude. As with the object, so with the camera. Once it had been focussed on the cadaver, it was immovably screwed to the floor, and thus camera and cadaver retained their respective positions throughout the whole of the dissections.

In the photography of the right and left sides of this cadaver, as, for example, Plates 44 and 45, a second camera was employed. This camera had necessarily to change its position, and it is for this reason that photographs so taken are not given to scale, though as the clinical lines are displayed and their distances known, it is perfectly easy to calculate any measurements thereon.

Every photograph was recorded on an orthochromatic half plate, from which an enlargement to scale was made. At first bromide paper was employed for the enlargements, but it was found that the unequal shrinkage of the paper during the photographic manipulations interfered with the accuracy of the work, and these had to be discarded in favour of opal plates, which allow of no shrinkage whatsoever. The enlargements were carried out at first by a daylight enlarger fitted with a most ingenious device, the invention of Mr. Anketell M. Henderson of the University of Melbourne, which insures the enlarged image always remaining in focus, and thus renders it perfectly simple to enlarge up to the desired scale.

When the decision to employ opal plates instead of bromide paper had been reached, the daylight enlarger was discarded in favour of an electric dark-room enlarger, in which the image being visible during the whole of the photographic operations, it is perfectly easy to enlarge to any desired scale.

The enlarged opal plate was coloured somewhat diagrammatically by means of Japanese transparent water tints—kindly brought under my notice by my friend Dr. F. J. Clendinnen of Melbourne—and of course from the specimen direct. Any necessary strengthening of the photographic shadows was made from the specimen by means of weak washes of lamp black, and from these original life-size photographs the accompanying illustrations are obtained by photographic reduction and a three-colour process.

The whole of the complicated photography of the originals was entirely carried out in my laboratory by my assistant, Mr. W. H. Preston, to whose skill and patience the present work owes much. For the colouration and subsequent preparation of the enlargements I am myself responsible.

Of the sixty original plates of the present work, six, namely, Plates 15, 19, 36, 42, 44, and 51 were forwarded to, accepted by, and hung in, the Dresden International Photographic Exhibition of 1909.

List of the Plates.

As the plates will well repay constant and repeated study by those sufficiently interested in the subject of sectional anatomy, they may be allowed to speak for themselves. The descriptive terminology is naturally that of the Basle International Commission of 1895, with the ordinary English term added where they differ. In the succeeding paragraph are appended the very few remarks which it is necessary to make.

Head and Neck—Transverse Sections.

1. Right lateral view of the head, showing the planes of the sections.
2. Section number one, 2 cm. caudal to the vertex.
3. Section number two, 4 cm. caudal to the vertex.
4. Section number three, 6 cm. caudal to the vertex.
5. Section number four, 8 cm. caudal to the vertex.
6. Section number five, 10 cm. caudal to the vertex.
7. Section number six, 12 cm. caudal to the vertex.
8. Section number seven, 14 cm. caudal to the vertex.
9. Section number eight, 16 cm. caudal to the vertex.
10. Section number nine, 18 cm. caudal to the vertex.
11. Section number ten, 20 cm. caudal to the vertex.
12. Reconstruction of the head, showing the norma lateralis dextra of the skull.
13. Reconstruction of the head, showing the facies lateralis of the right cerebral hemisphere.
14. Reconstruction of the head, showing the facies medialis of the left cerebral hemisphere.
15. Head of a male, aged 48, showing the facies lateralis of the right cerebral hemisphere, with the landmarks for Chiene's cranio-cerebral topographical method.

Thorax and Abdomen—Transverse Sections.

16. Ventral view of the trunk, showing Addison's lines, the planes of sections, the more important osseous landmarks, and the vertical and horizontal centimetre scales.
17. Section number one through the *trans-manubrium plane.*
18. Section number two, 4 cm. caudal to the manubrium sterni.
19. Section number three, 8 cm. caudal to the manubrium sterni.
20. Section number four through the *trans-thoracic plane*, 12·25 cm. caudal to the manubrium sterni.
21. Section number five, 16·25 cm. caudal to the manubrium sterni.
22. Section number six, 20·25 cm. caudal to the manubrium sterni.
23. Section number seven through the *trans-pyloric plane*, 24·50 cm. caudal to the manubrium sterni.
24. Section number eight, 28·50 cm. caudal to the manubrium sterni.
25. Section number nine, 32·50 cm. caudal to the manubrium sterni.
26. Section number ten through the *trans-tubercular plane*, 36·75 cm. caudal to the manubrium sterni.
27. Section number eleven, 40·75 cm. caudal to the manubrium sterni.
28. Section number twelve, 44·75 cm. caudal to the manubrium sterni.
29. Section number thirteen through the *trans-symphyseal* plane, 49 cm. below the manubrium sterni.
30. Reconstruction of the trunk, showing the surface positions of the viscera projected on to the body from the sections, Addison's lines, the planes of sections, the more important osseous landmarks, and the vertical and horizontal centimetre scales.
31. A similar reconstruction showing the surface positions of the heart and chief blood-vessels projected on to the body from the sections. Other details as under Plate 30.

THORAX AND ABDOMEN—SAGITTAL SECTIONS.

32. Ventral view of the trunk, showing Addison's lines, the planes of sections, the more important osseous landmarks, and the vertical and horizontal centimetre scales.
33. Section number one, 9 cm. to the left of the median plane viewed from the right.
34. Section number two through the *left lateral line*, 6 cm. to the left of the median plane viewed from the right.
35. Section number three, 3 cm. to the left of the median plane viewed from the right.
36. Section number four through the *median plane* viewed from the right.
37. Section number five, 3 cm. to the right of the median plane viewed from the right.
38. Section number six through the *right lateral line*, 6 cm. to the right of the median plane viewed from the right.
39. Section number seven, 9 cm. to the right of the median plane viewed from the right.

THORAX AND ABDOMEN—TOPOGRAPHICAL DISSECTIONS.

40. Ventral view of the trunk, showing Addison's lines, the planes between which the several dissections are made, the more important osseous landmarks, and the vertical and horizontal centimetre scales.
41. Ventral dissection of the cranial quarter of the trunk.
42. The same dissection extended to the neck.
43. Ventral dissection of the cranial half of the trunk.
44. Dissection of the right pleura parietalis from the right.
45. Dissection of the left pleura parietalis from the left.
46. The heart and pericardium *in situ* after removal of the lungs.
47. Dissection of the valves of the heart *in situ*.
48. Dissection of the right side of the cavum thoracis after removal of the right lung.
49. Dissection of the left side of the cavum thoracis after removal of the left lung.
50. Ventral dissection of the third quarter of the trunk.
51. Dissection of the liver bed after removal of the liver viewed from the right.
52. Deep dissection of the thorax and superficial dissection of the abdomen after removal of the liver.
53. Dissection of the left side of the cranial three-quarters of the trunk viewed from the left and showing the spleen *in situ*.
54. Ventral dissection of the abdomen after removal of the liver and stomach.
55. Dissection of the large intestine after removal of the colon transversum.
56. Dissection of the duodenum and pancreas.
57. Dissection of the kidneys and abdominal blood-vessels and nerves.

DORSAL ASPECT OF THE TRUNK—TOPOGRAPHICAL DISSECTIONS.

58. Dissection number one. Os sacrum *in situ*.
59. Dissection number two. Os sacrum removed.
60. Dissection number three. Intestinum rectum removed.

The plates being sufficiently illustrative in themselves, but few remarks are called for. There are, however, a few instances where some explanation is necessary. Thus, in Plates 12, 13, and 14, the mode of reconstruction of the head from the sections is as follows:—

Remarks on the Plates.

Before cutting the sections the vertical radius or auricular height is measured — in this case 122 mm. After the sections are cut and photographed, they are replaced with sheets of absorbent paper between them to replace the tissue lost by the saw cut. To reduce this loss of tissue to a minimum a specially manufactured saw was, as stated, employed. On reconstructing the head, the auricular height should, if sufficient paper has been employed, be the same as before cutting. In this instance it was so. The head, having been satisfactorily reconstructed, is then embedded in a vertical position in plaster of Paris in such a way that only the left side is covered by plaster, which thus ensures absolute rigidity and immovability of the divided sections. The rest of the manipulation of skin, bone, and brain is then easy.

Plate 15 illustrates the facies lateralis of the right cerebral hemisphere of a white man, the head having been cut and reconstructed in a precisely similar manner. The landmarks necessary for Chiene's cranio-cerebral topographical method are also appended.

Plates 30 and 31 are reconstructions from the sections of the viscera and blood-vessels projected on to the surface. They afford a remarkably accurate representation of surface anatomy relationships. By means of the appended centimetre scales the precise position of any viscus or blood-vessel can be transferred to the living subject. In this connection it is necessary to state that in both the experience of Dr. Addison and myself it has been found that in the adult the distance from manubrium sterni to symphysis ossium pubis is, quite irrespective of height, remarkably constant, as is also that of the interspinous distance. The former is seldom less than 48 cm. or more than 52 cm., whilst the latter is usually 24 cm., though there is, of course, not infrequently bilateral asymmetry.

In the sagittal sections, Plates 33 to 39, all are viewed from the right, number 33 being the extreme left section and 39 the extreme right section. This series of plates contains many interesting points, thus, Plate 35, illustrating a section made 3 cm. to the left of the median plane, contains almost the whole length of the aorta thoracalis et abdominalis. Plate 36 is a median sagittal section in which, as every vertebra is numbered, the vertebral levels of structures can be ascertained at a glance. As a general rule these levels are here lower than as usually stated in text-books, but how much of these differences is due to the advanced age of the subject, and how much to the insufficient data upon which the text-book statements are usually made, is open to question.

Plate 51 illustrates, as seen from the right, a somewhat novel view of the liver bed, where every caudal and dorsal relation of the organ can be studied.

Plate 58, the first dissection of the trunk from the dorsum, illustrates the importance to the surgeon of a knowledge of anatomical variations. In connection with the remarkably low-position of the right kidney there is a combination of all those regional variations apt to complicate kidney operations, namely, the short twelfth rib, the low pleura parietalis, a low-lying liver, and an abnormally low kidney. On the left side the kidney is normal, so that the two sides afford a most instructive study for those interested in the surgery of the region. The whole of this case has been fully described elsewhere. (31)

Suggested Methods of Using the Plates.

In addition to the primary object of the work, that of furnishing an accurate guide to the sectional anatomy of the body for clinical purposes, there are other uses to which the plates may be put. By their means any structure can be quickly and accurately transferred to its correct position on the living subject. They will also furnish information as to structures likely to be injured in perforating and gunshot wounds, as well as affording useful information as to structures to be traversed in surgical operations.

Lantern slides made from the plates cannot fail to be of utility to the teaching anatomist and surgeon.

Lastly, by means of transparencies thrown on to a screen, greatly enlarged tracings can be constructed suitable for diagrams or examination purposes.

Such are some of the uses to which the plates may be put, and there are doubtless others to which the ingenuity of those sufficiently interested in the work can apply them. But in any case it is the author's earnest hope that even in their present form they may prove of service to the medical profession in general and the specialist in particular.

Conclusion.

It only remains to add that the labour involved in the present work could not have been accomplished without the material assistance of others. To some of these acknowledgment has already been made in the body of the text.

There remain my friend and colleague, Professor J. T. Wilson of the University of Sydney, to whom I am indebted for much kindly advice and assistance, and above all for his generous encouragement at times when the labour involved would otherwise have induced me to throw the work aside unfinished.

To Dr. J. W. Barrett, the medical profession in Victoria, and my colleagues in the Australian Universities I have to express my warmest thanks for their whole-hearted and generous support at a critical time in the history of the publication of this work.

Lastly, to my publishers, Messrs. William Green & Sons, of Edinburgh, I am very deeply indebted for the manner in which they have produced the plates in particular and the work in general.

RICHARD J. A. BERRY.

University of Melbourne, 1911.

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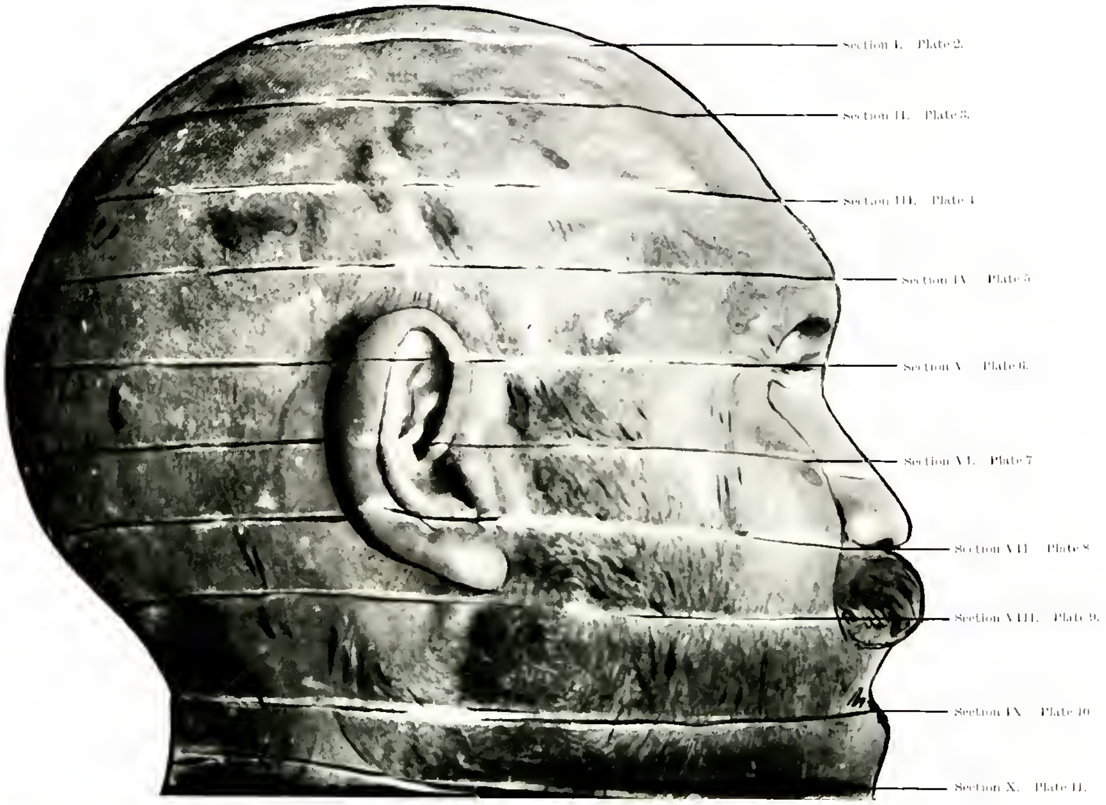
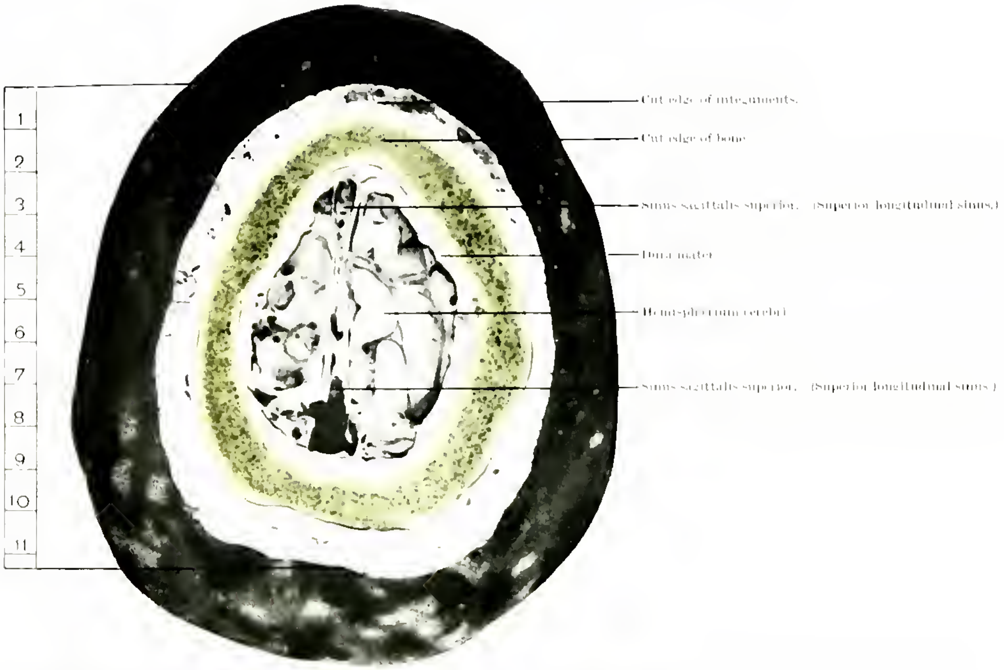
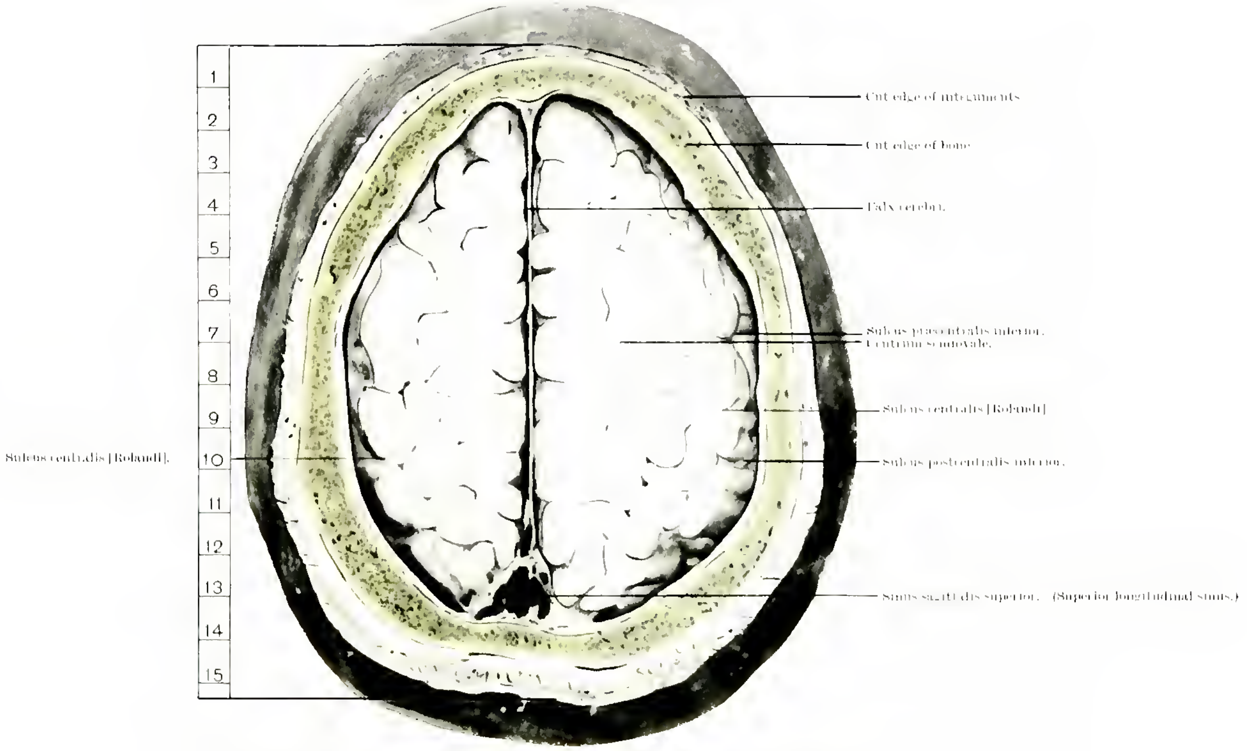


1. Right Lateral View of the Head, showing the Planes of the Sections.


1
2
3
4
5
6
7
8
9
10
11
Cut edge of integuments.
Cut edge of bone
Sinus sagittalis superior. (Superior longitudinal sinus.)
Dura mater
Hemisphaerium cerebri
Sinus sagittalis superior. (Superior longitudinal sinus.)

2. SECTION NUMBER ONE, 2 CM. CAUDAL TO THE VERTEX.


Cut edge of integuments
Cut edge of bone
Falx cerebri.
Sulcus praecentralis inferior.
Centrum semiovale.
Sulcus centralis [Rolandi]
Sulcus postcentralis inferior.
Sinus sagittalis superior. (Superior longitudinal sinus.)
Sulcus centralis [Rolandi].
1
2
3
4
5
6
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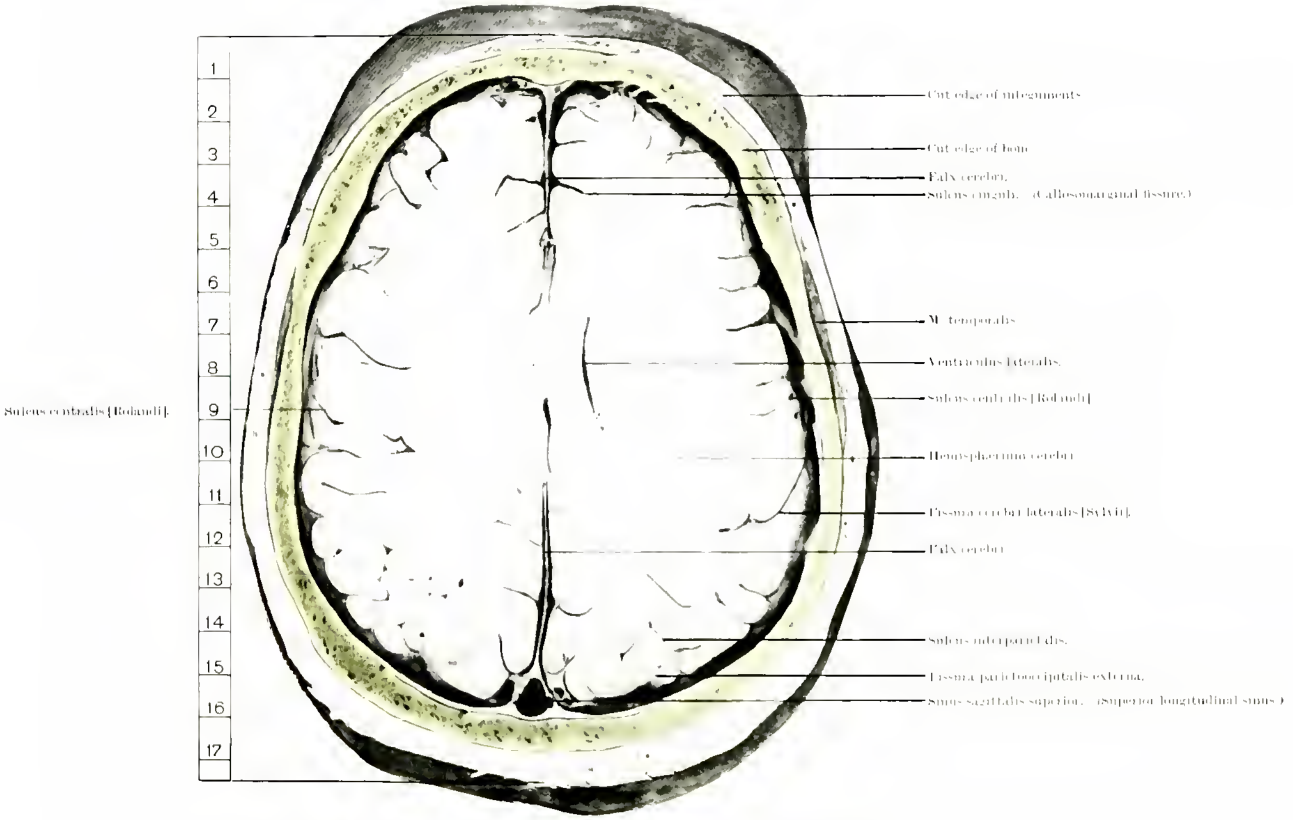
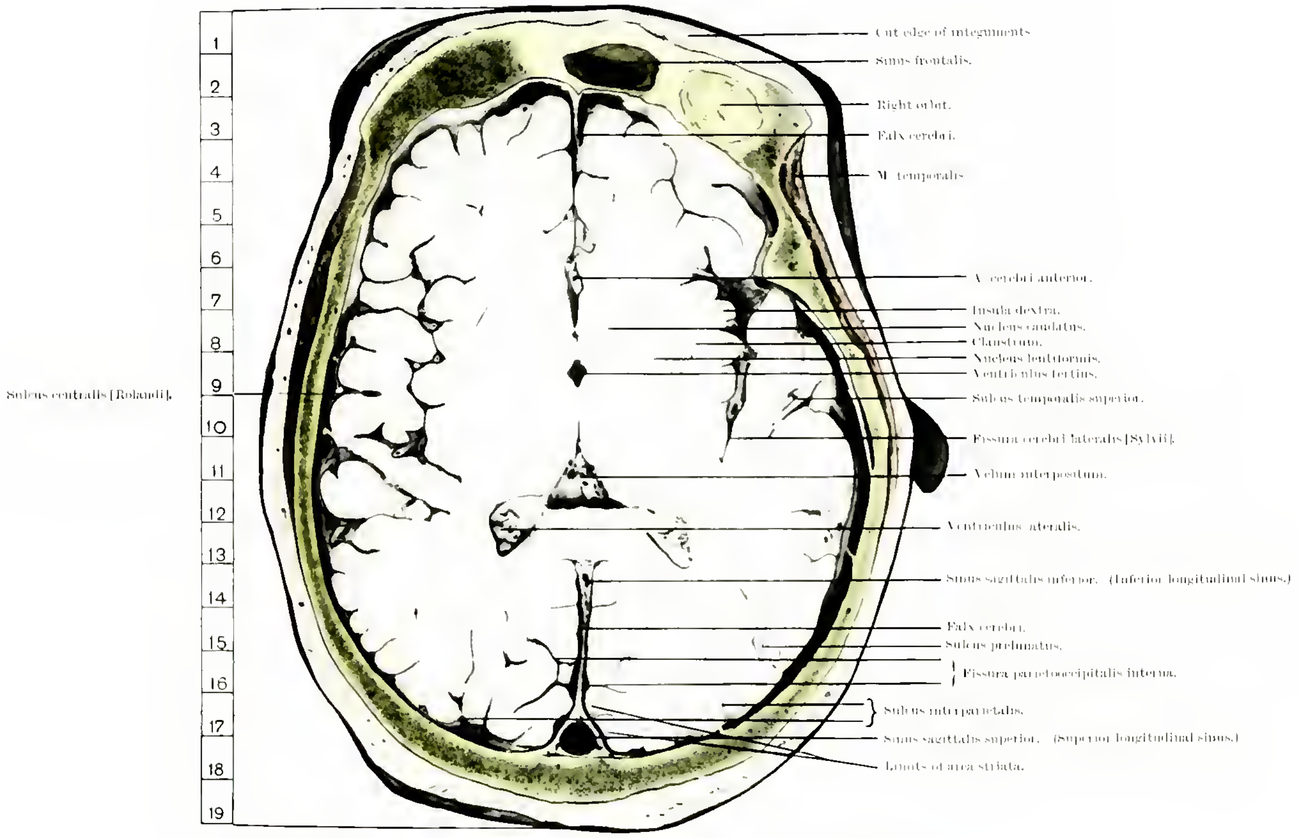
10
11
12
13
14
15

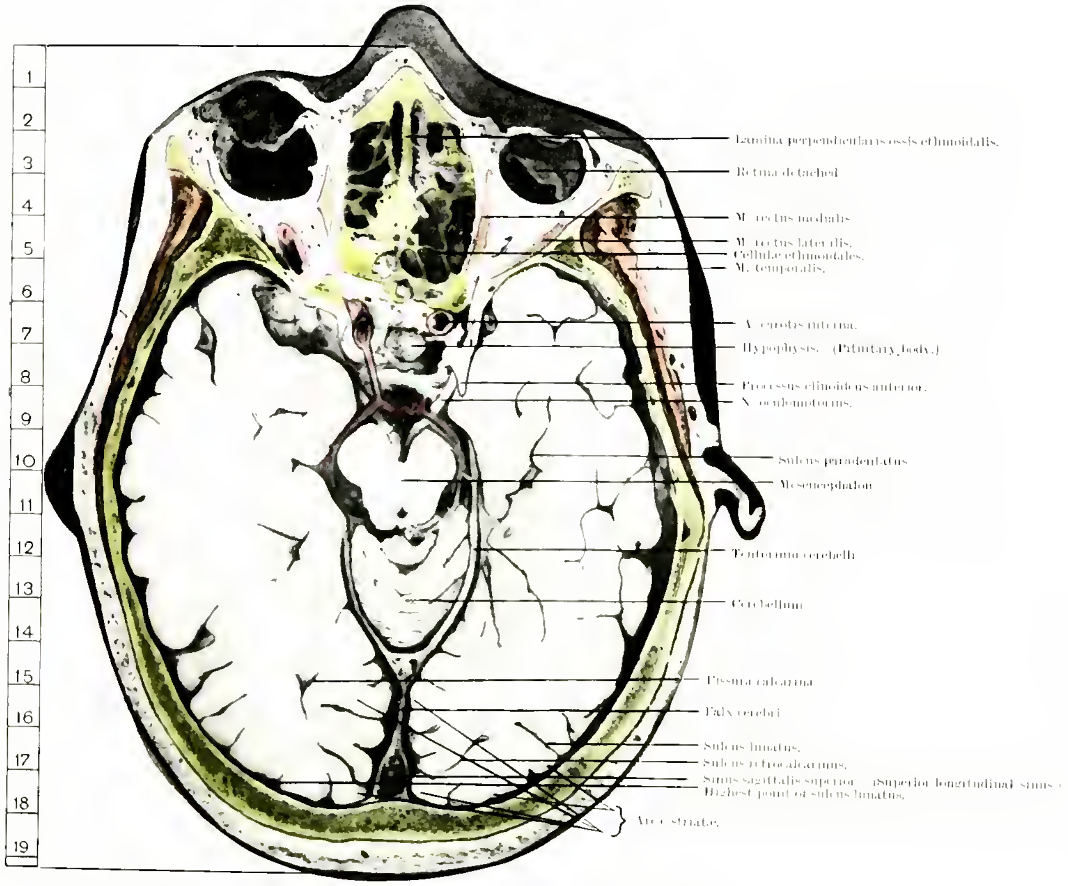
3. Section Number Two, 4 cm. Caudal to the Vertex.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
Sulcus centralis [Rolandi].
Cut edge of integuments
Cut edge of bone
Falx cerebri.
Sulcus cinguli. (Callosomarginal fissure.)
M. temporalis
Ventriculus lateralis.
Sulcus centralis [Rolandi]
Hemisphaerium cerebri
Fissura cerebri lateralis [Sylvii].
Falx cerebri
Sulcus interparietalis.
Fissura parietooccipitalis externa.
Sinus sagittalis superior. (Superior longitudinal sinus.)

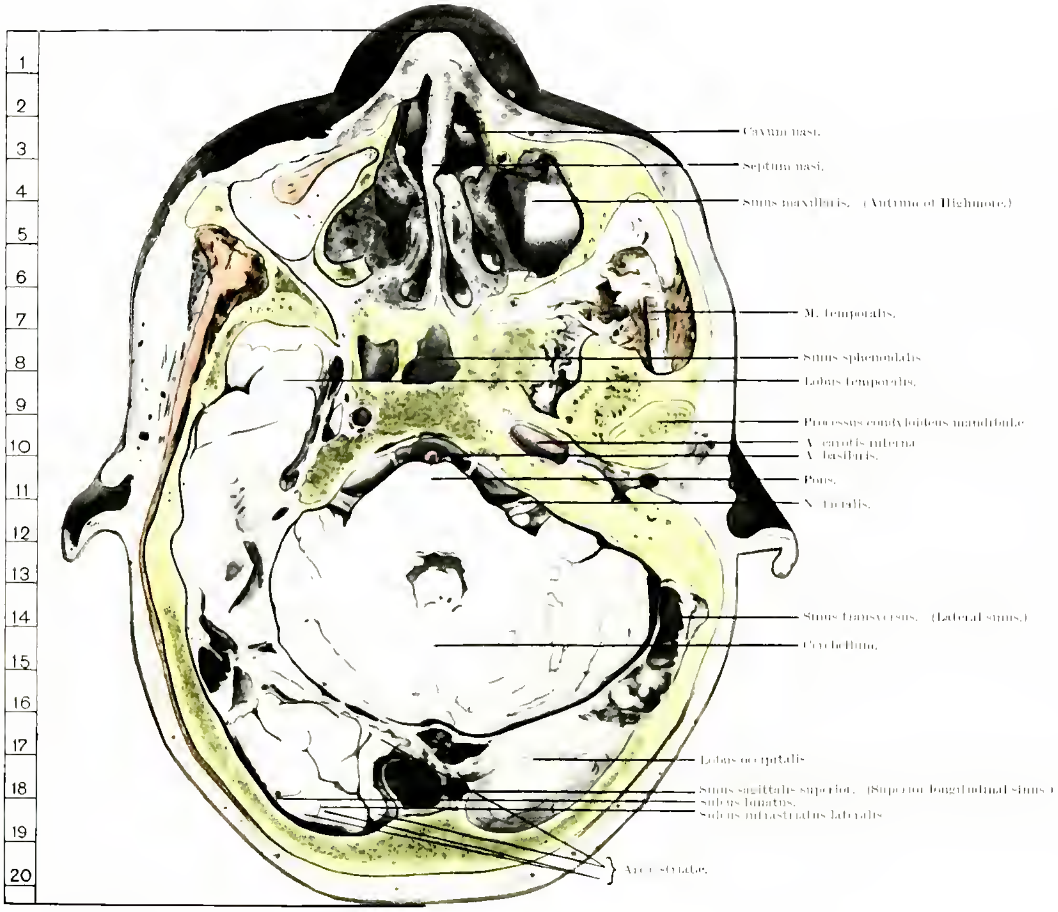
4. Section Number Three, 6 cm. Caudal to the Vertex.



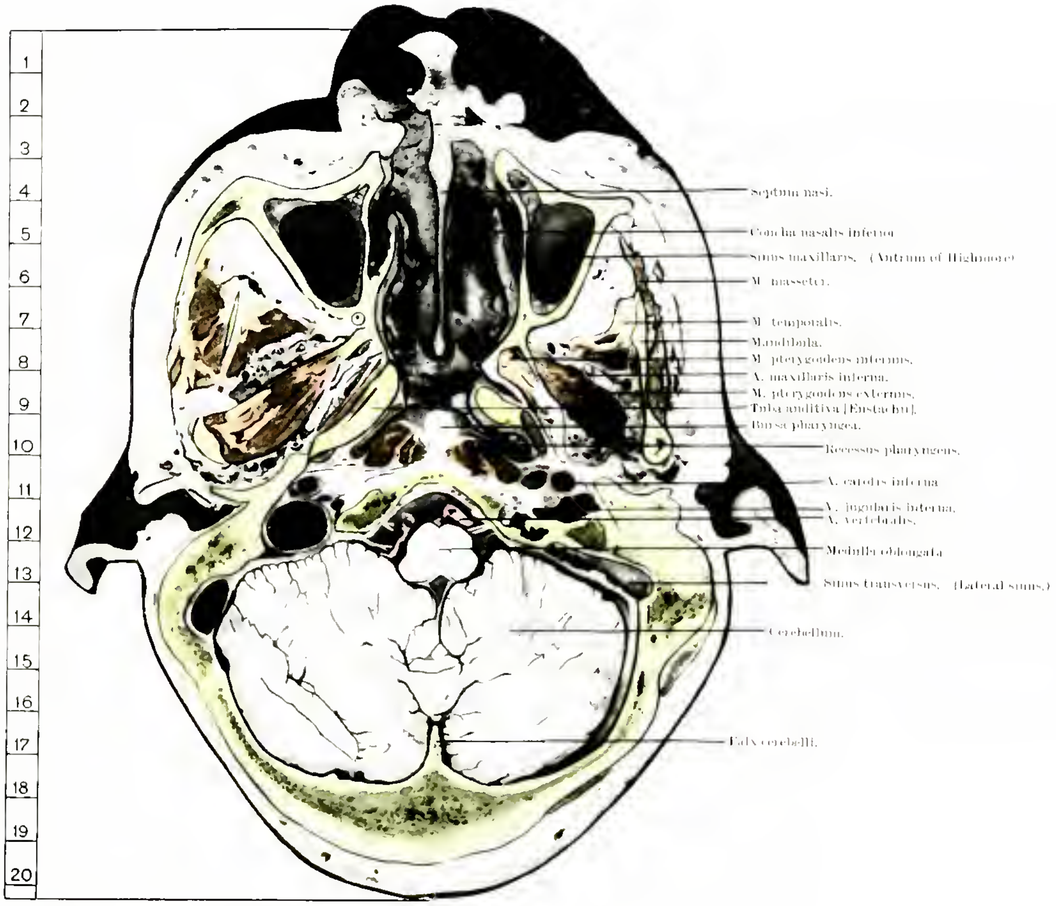
5. SECTION NUMBER FOUR, 8 CM. CAUDAL TO THE VERTEX.



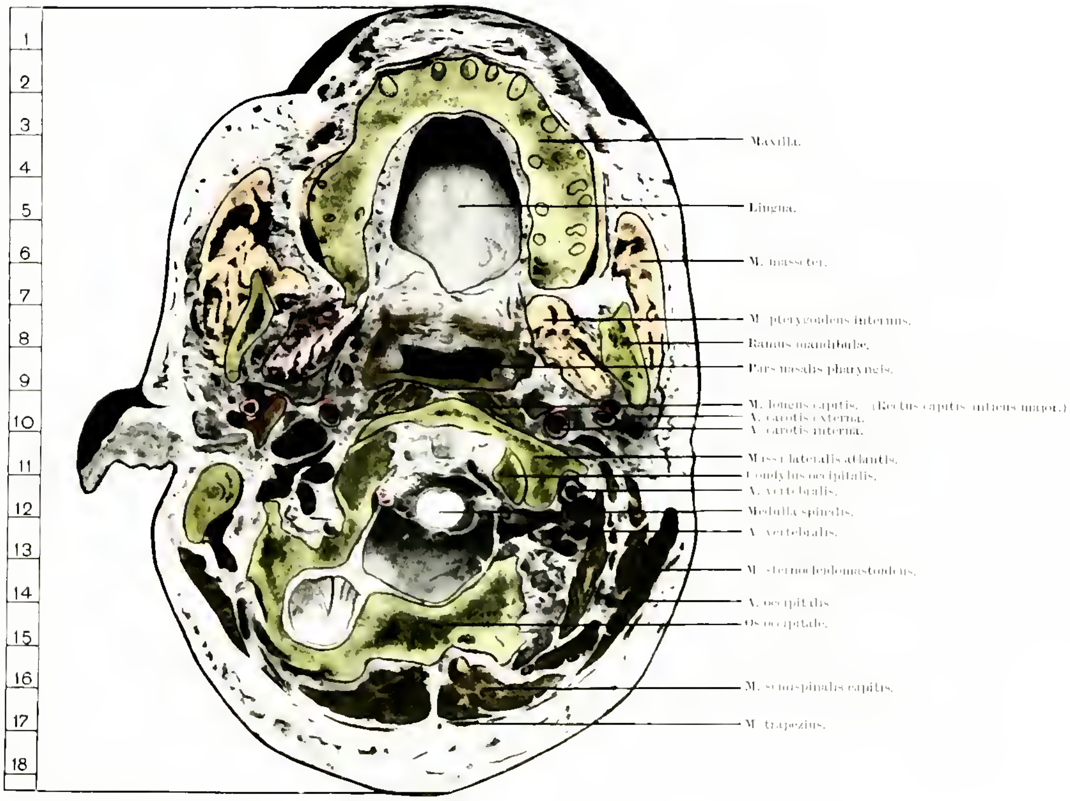
6. Section Number Five, 10 cm. Caudal to the Vertex.



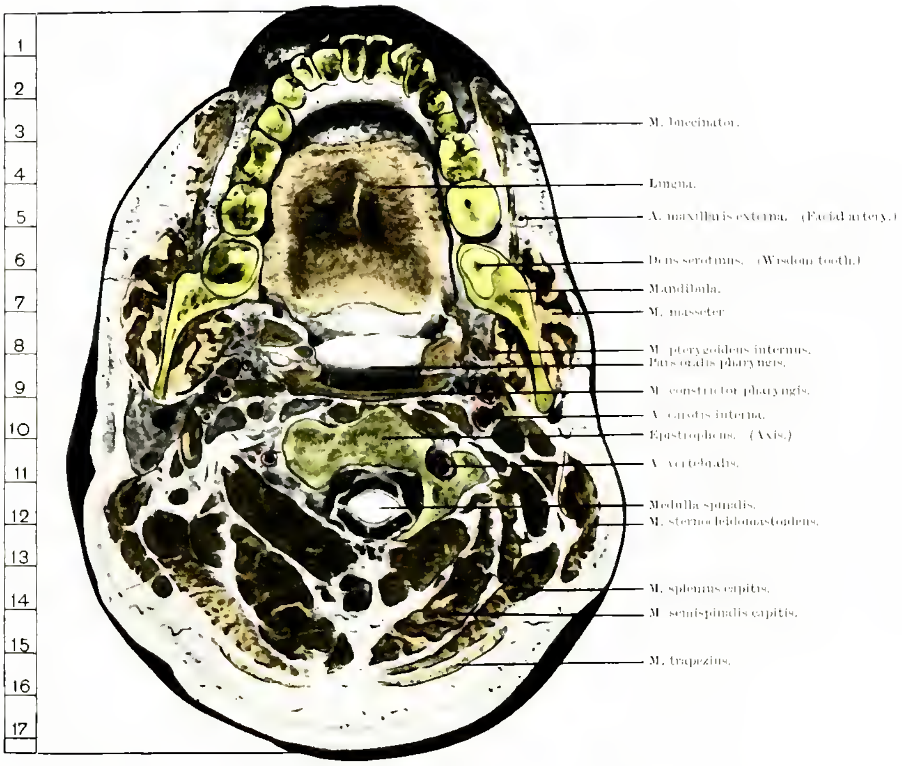
7. Section Number Six, 12 cm. Caudal to the Vertex.



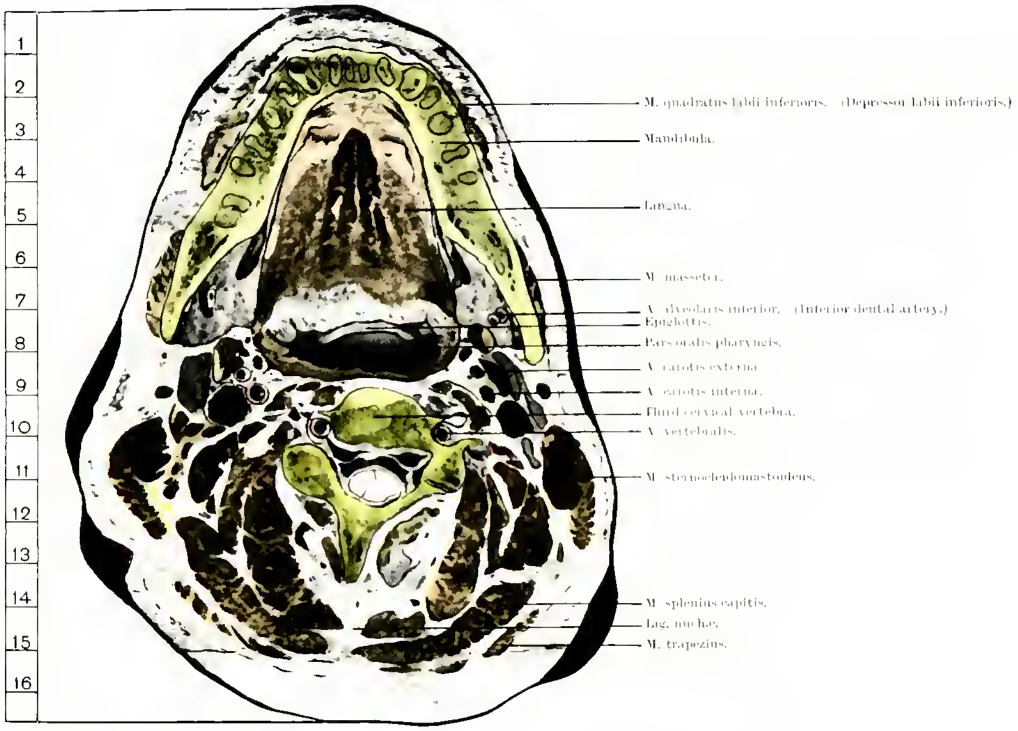
8. SECTION NUMBER SEVEN, 14 CM. CAUDAL TO THE VERTEX.



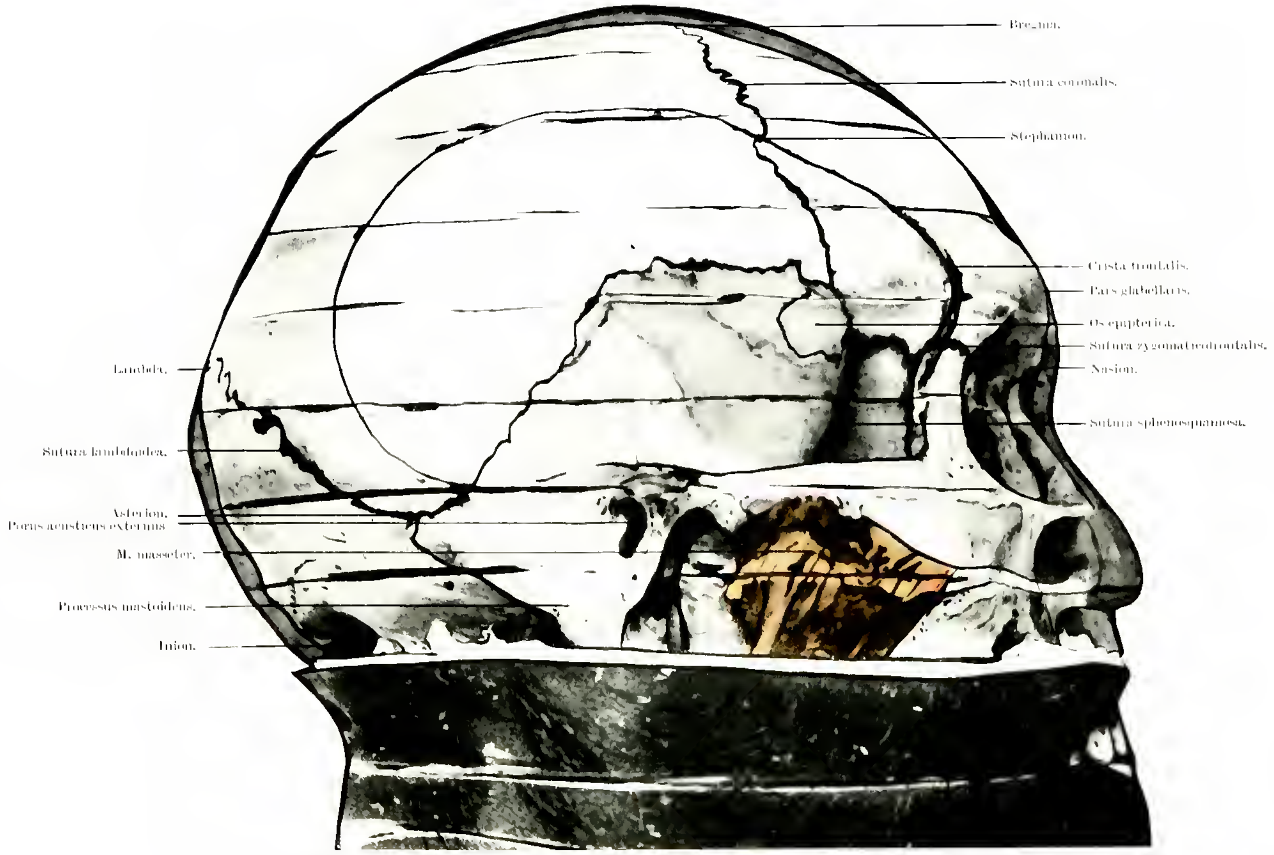
9. Section Number Eight, 16 cm. Caudal to the Vertex.



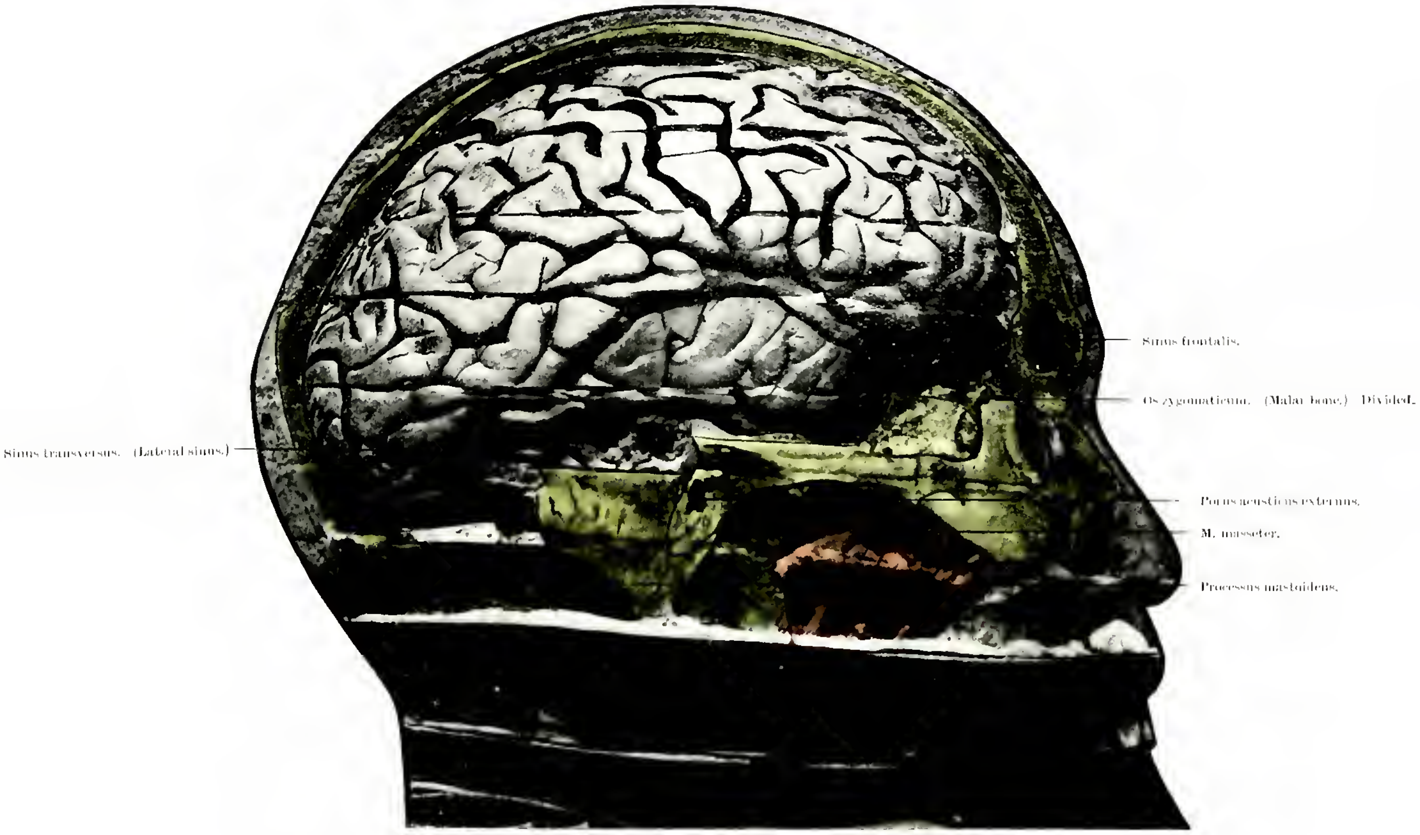
10. Section Number Nine, 18 cm. Caudal to the Vertex.



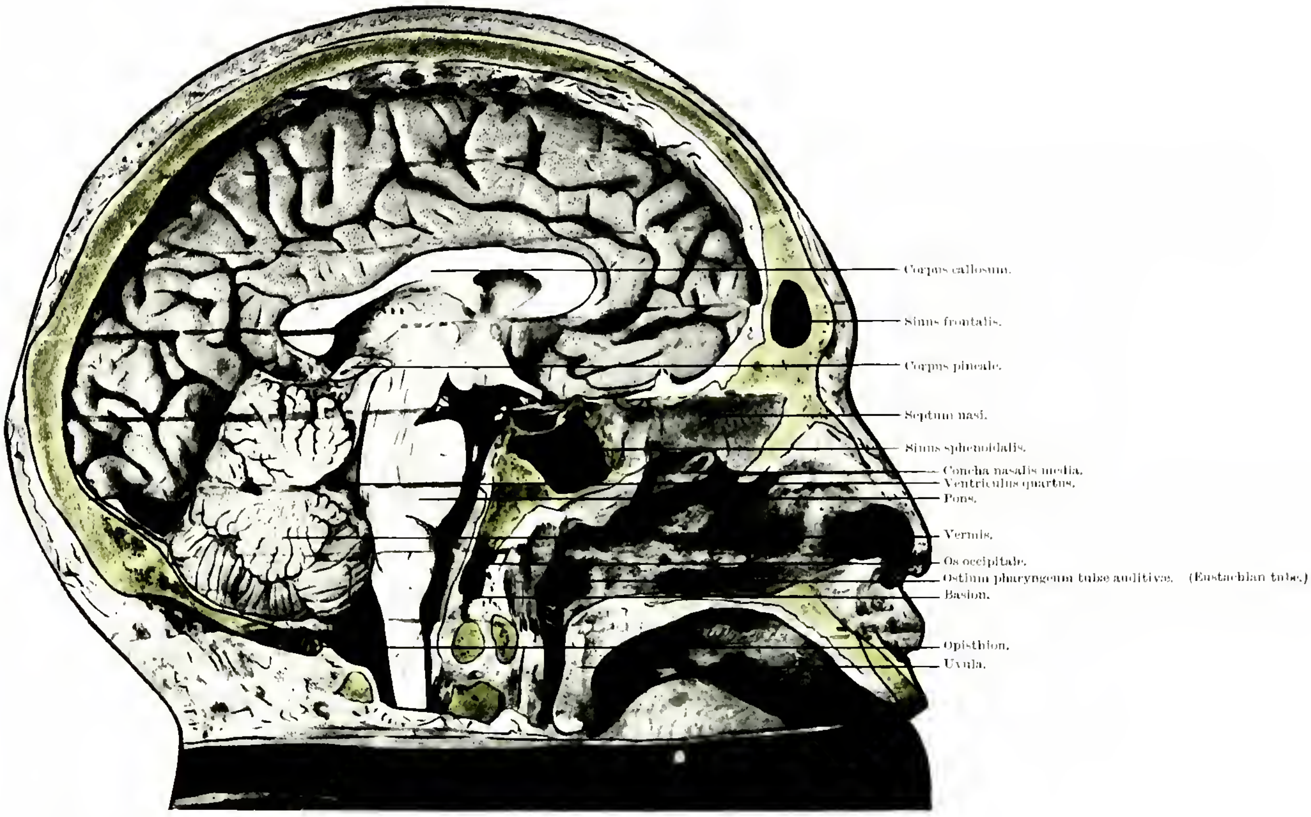
11. SECTION NUMBER TEN, 20 CM. CAUDAL TO THE VERTEX.



12. RECONSTRUCTION OF THE HEAD, SHOWING THE NORMA LATERALIS DEXTRA OF THE SKULL.

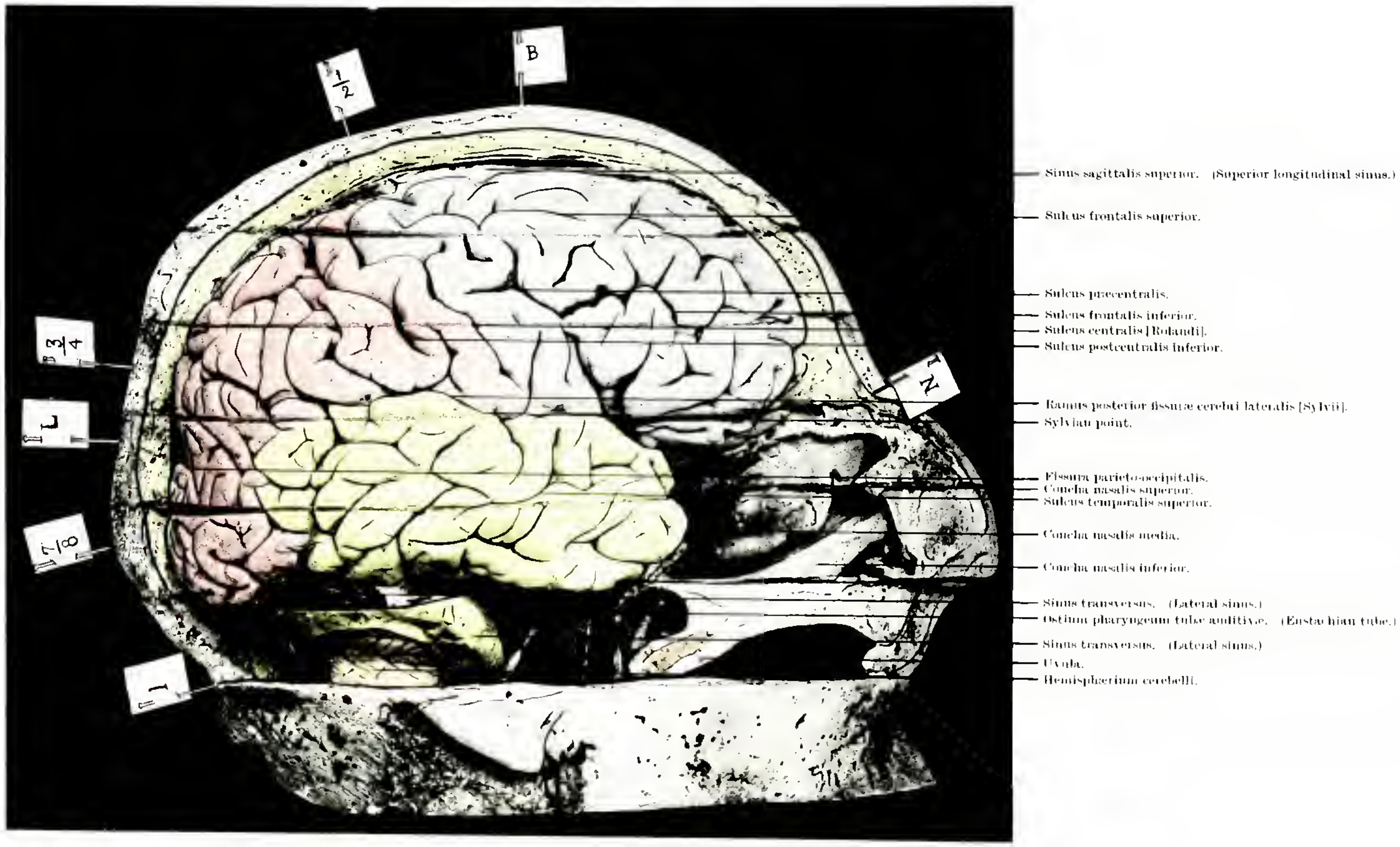

Sinus frontalis.
Os zygomaticum. (Malar bone.) Divided.
Sinus transversus. (Lateral sinus.)
Porus acusticus externus.
M. masseter.
Processus mastoideus.

13. Reconstruction of the Head, showing the Facies Lateralis of the Right Cerebral Hemisphere.

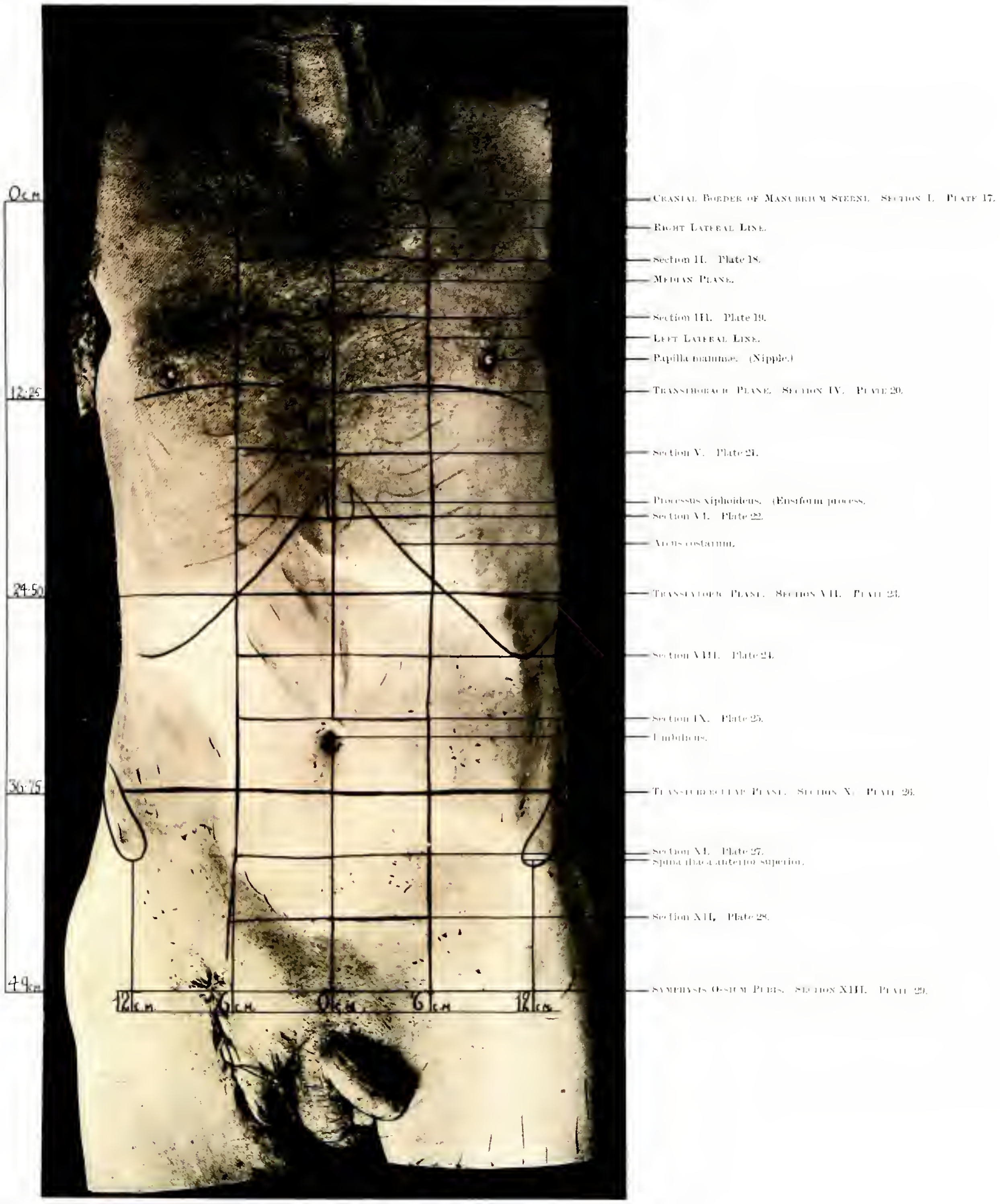


14. RECONSTRUCTION OF THE HEAD, SHOWING THE FACIES MEDIALIS OF THE LEFT CEREBRAL HEMISPHERE.

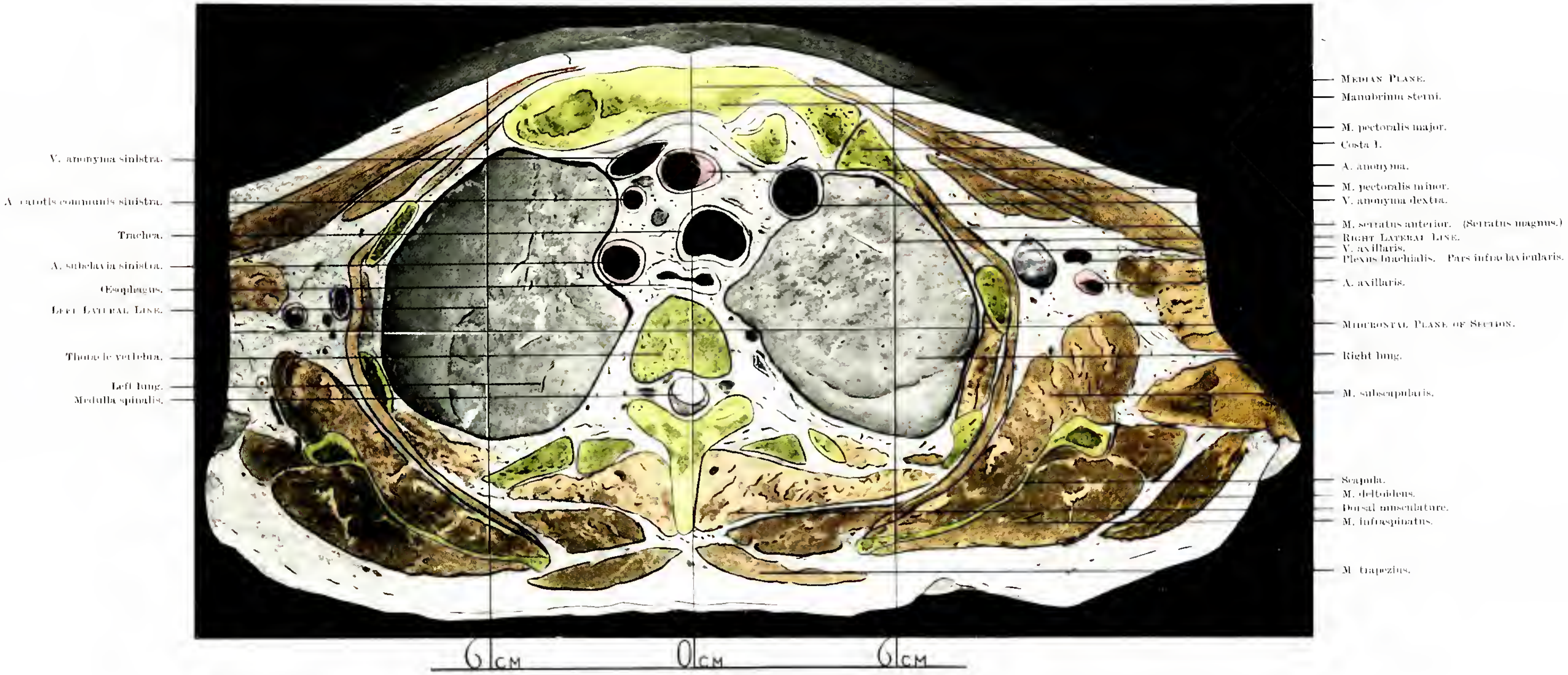
N.—The Nasion.
B.—The Bregma.
L.—The Lambda.
I.—The Inion.
$\frac{1}{2}$.—Chiene's mid point.
$\frac{3}{4}$.—Chiene's three-quarter point.
$\frac{7}{8}$.—Chiene's seven eighths point.


B
$\frac{1}{2}$
$\frac{3}{4}$
L
$\frac{7}{8}$
I
N
Sinus sagittalis superior. (Superior longitudinal sinus.)
Sulcus frontalis superior.
Sulcus præcentralis.
Sulcus frontalis inferior.
Sulcus centralis [Rolandi].
Sulcus postcentralis inferior.
Ramus posterior fissuræ cerebri lateralis [Sylvii].
Sylvian point.
Fissura parieto-occipitalis.
Concha nasalis superior.
Sulcus temporalis superior.
Concha nasalis media.
Concha nasalis inferior.
Sinus transversus. (Lateral sinus.)
Ostium pharyngeum tubæ auditivæ. (Eustachian tube.)
Sinus transversus. (Lateral sinus.)
Uvula.
Hemisphærium cerebelli.

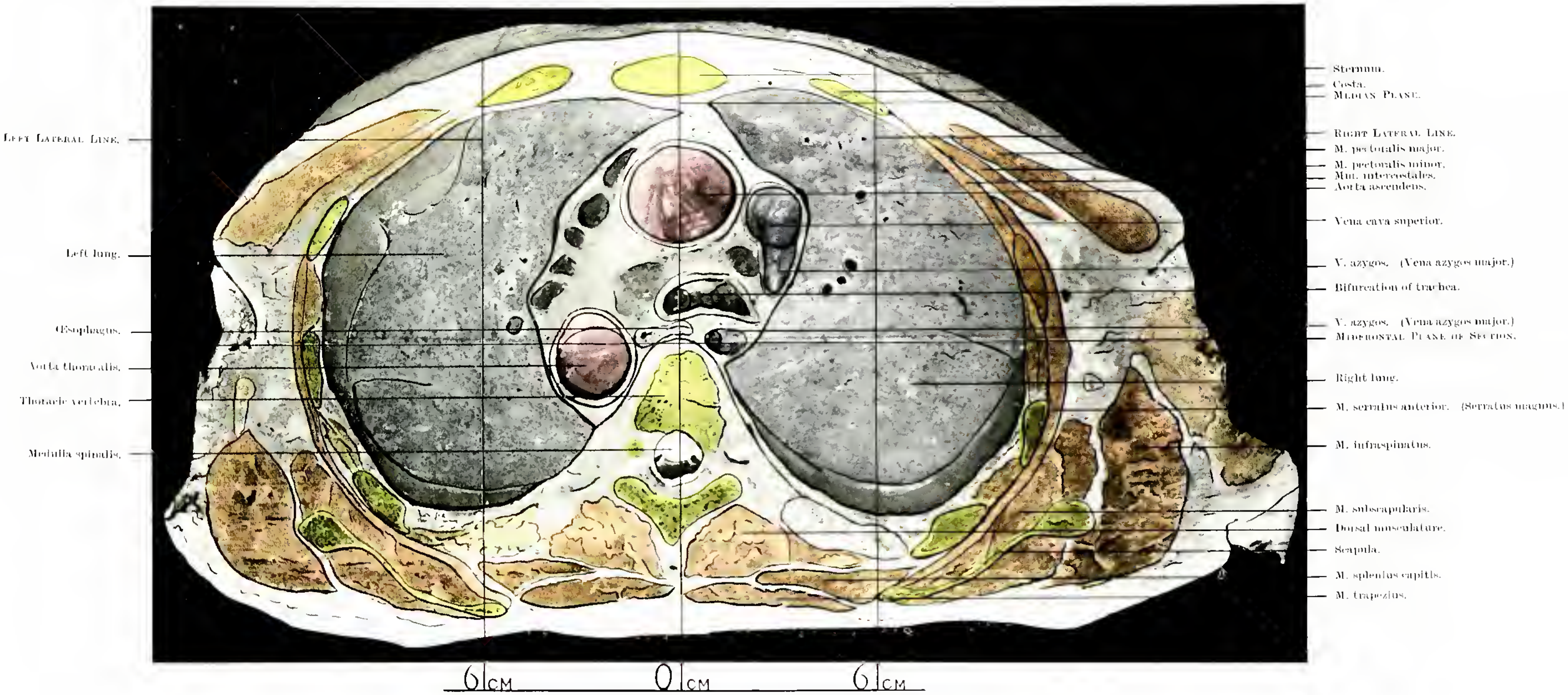
15. Head of a Male, aged 48, showing the Facies Lateralis of the Right Cerebral Hemisphere with the Landmarks for Chiene's Cranio-cerebral Topographical Method.


0cm
12·25
24·50
36·75
49cm
12cm
6cm
0cm
6cm
12cm
Cranial Border of Manubrium Sterni. Section I. Plate 17.
Right Lateral Line.
Section II. Plate 18.
Median Plane.
Section III. Plate 19.
Left Lateral Line.
Papilla mammae. (Nipple.)
Transthoracic Plane. Section IV. Plate 20.
Section V. Plate 21.
Processus xiphoideus. (Ensiform process.
Section VI. Plate 22.
Arcus costarum.
Transpyloric Plane. Section VII. Plate 23.
Section VIII. Plate 24.
Section IX. Plate 25.
Umbilicus.
Transtubercular Plane. Section X. Plate 26.
Section XI. Plate 27.
Spina iliaca anterior superior.
Section XII. Plate 28.
Symphysis Ossium Pubis. Section XIII. Plate 29.

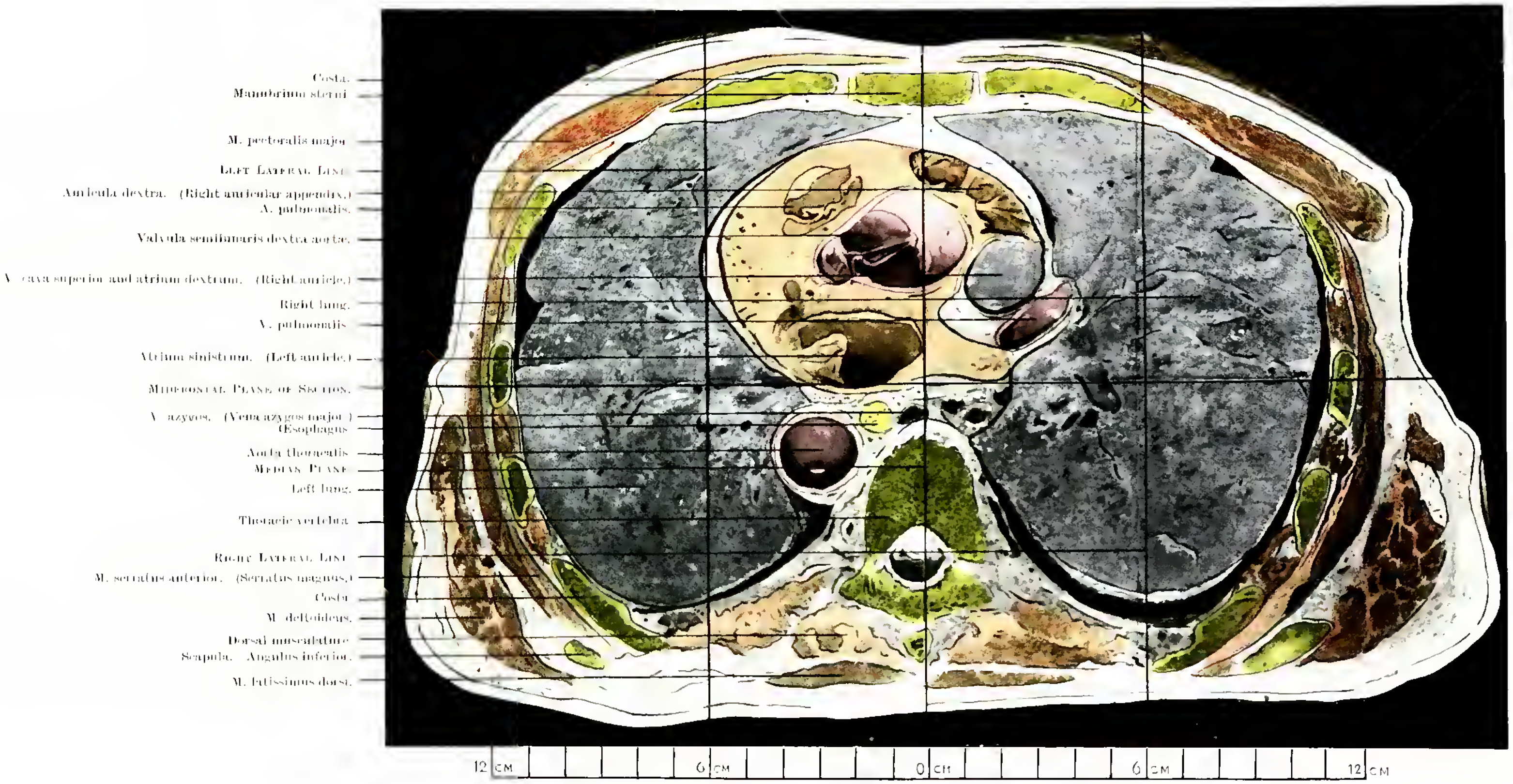
16. Ventral View of the Trunk, showing Addison's Lines, the Planes of Sections, the More Important Osseous Landmarks, and the Vertical and Horizontal Centimetre Scales.



17. SECTION NUMBER ONE, THROUGH THE TRANS-MANUBRIUM PLANE.

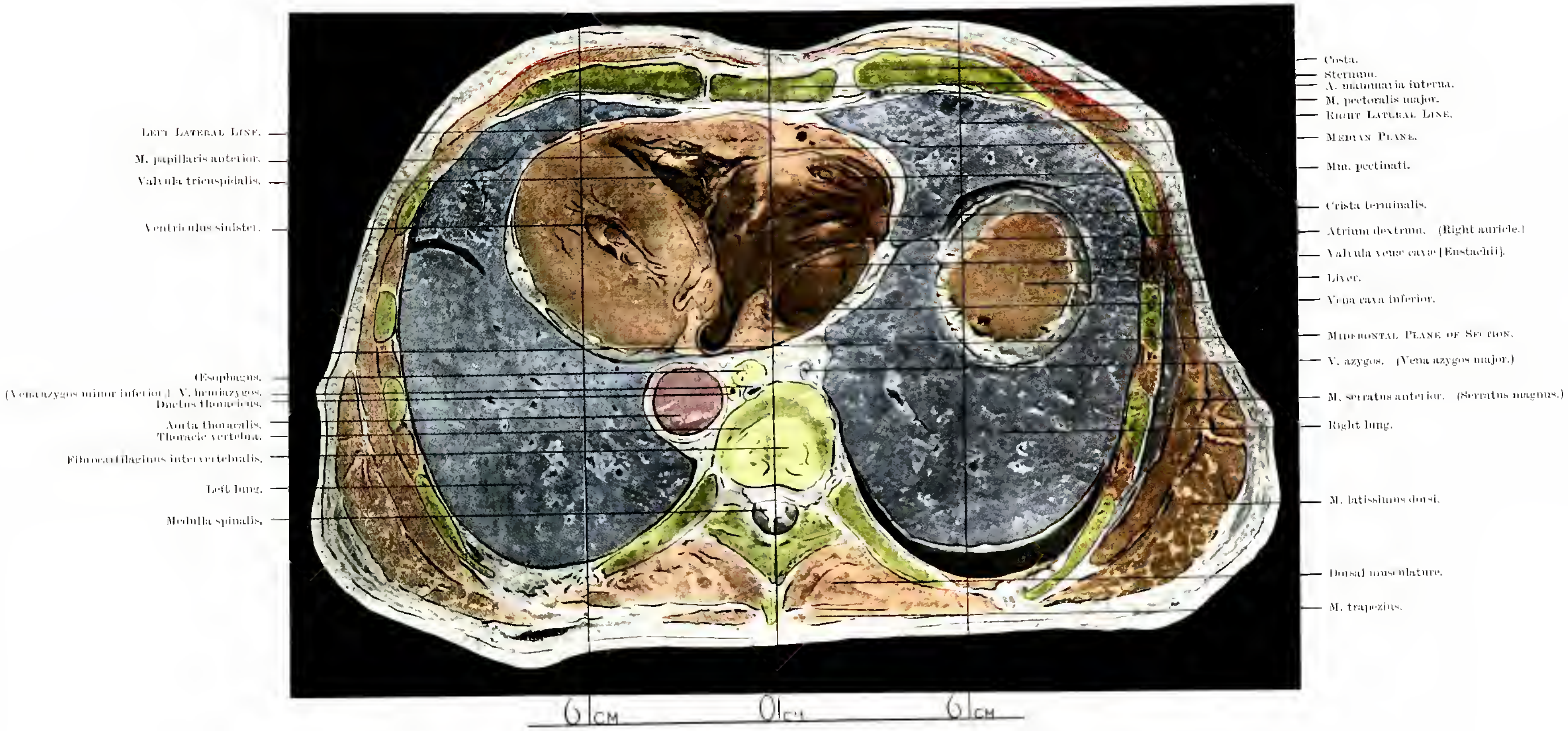


18. Section Number Two, 4 cm. Caudal to the Manubrium Sterni.

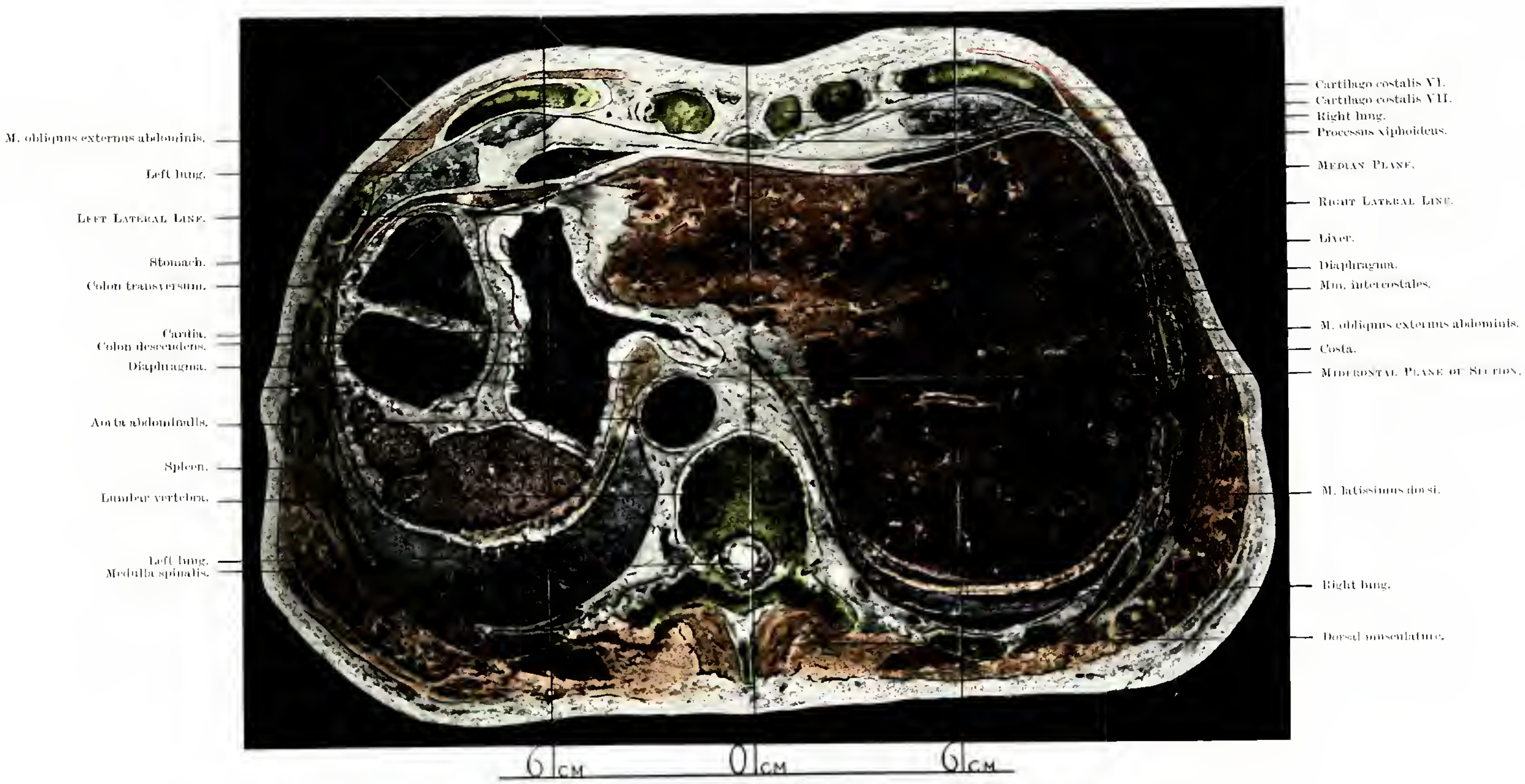


Costa.
Manubrium sterni
M. pectoralis major
LEFT LATERAL LINE
Auricula dextra. (Right auricular appendix.)
A. pulmonalis.
Valvula semilunaris dextra aortae.
V. cava superior and atrium dextrum. (Right auricle.)
Right lung.
V. pulmonalis
Atrium sinistrum. (Left auricle.)
MIDFRONTAL PLANE OF SECTION.
V. azygos. (Vena azygos major.)
Œsophagus
Aorta thoracalis
MEDIAN PLANE
Left lung.
Thoracic vertebra
RIGHT LATERAL LINE
M. serratus anterior. (Serratus magnus.)
Costa
M. deltoideus.
Dorsal musculature
Scapula. Angulus inferior.
M. latissimus dorsi.
12 CM
6 CM
0 CM
6 CM
12 CM

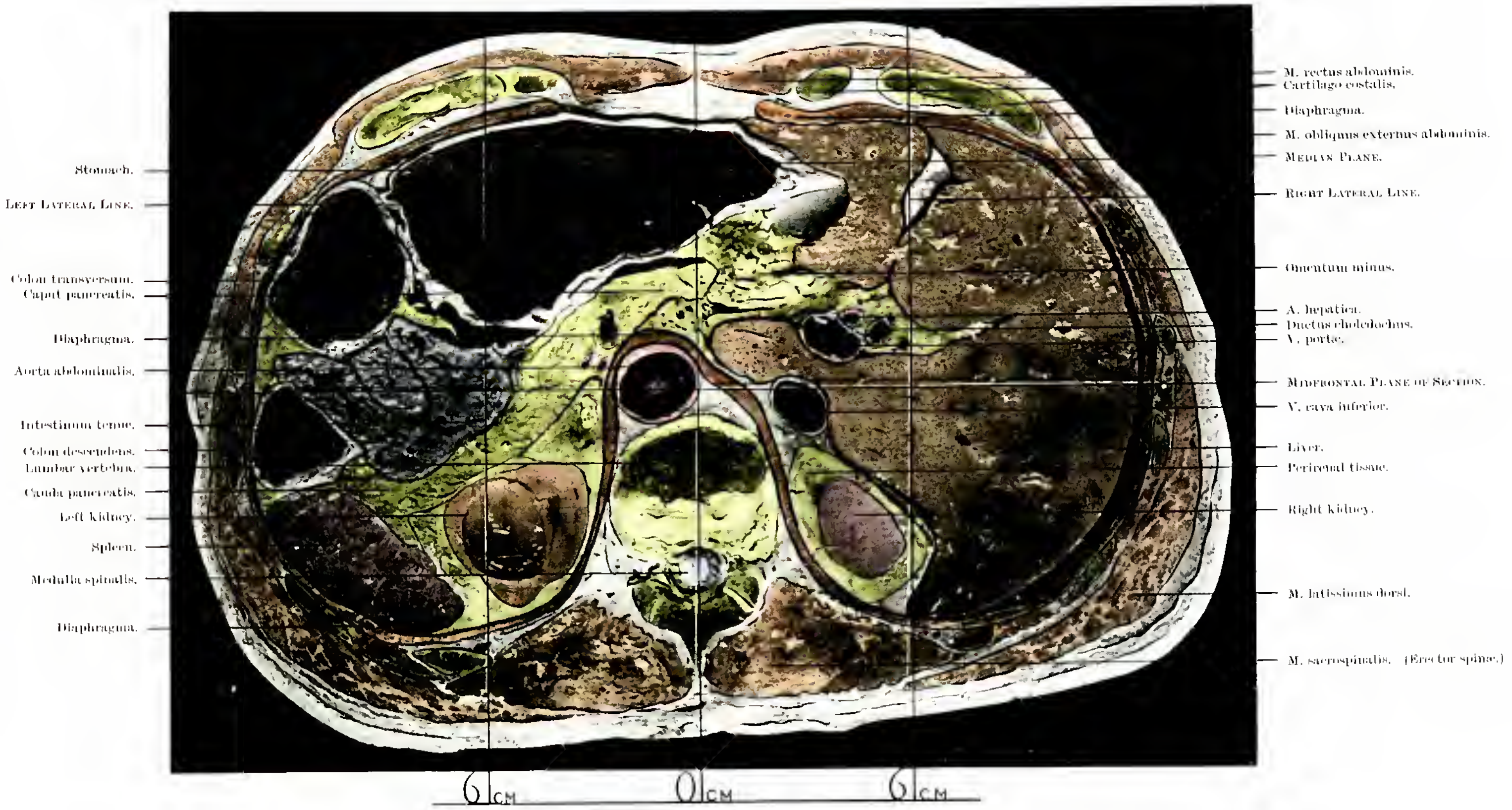
19. SECTION NUMBER THREE, 8 CM. CAUDAL TO THE MANUBRIUM STERNI.



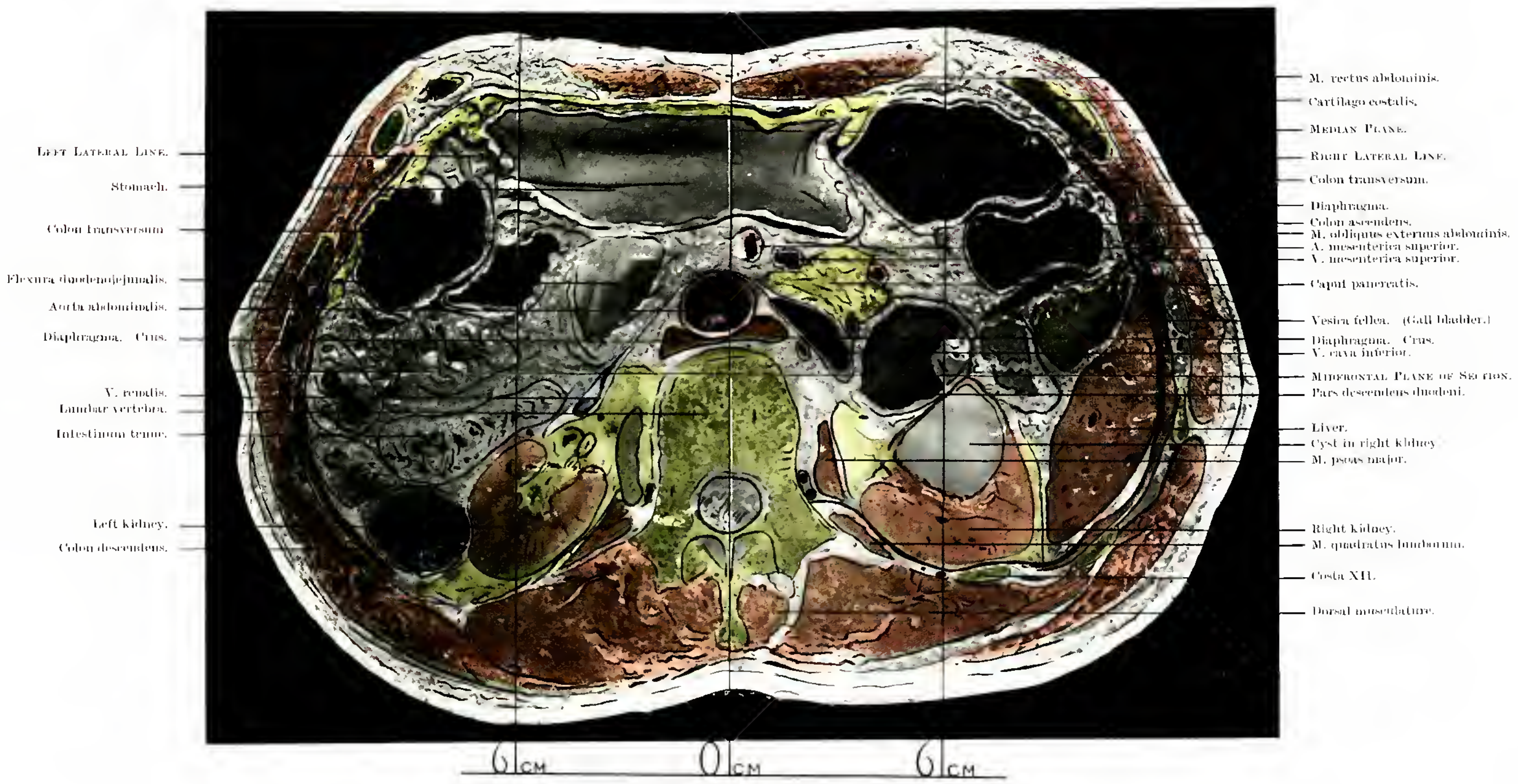
20. SECTION NUMBER FOUR, THROUGH THE TRANS-THORACIC PLANE, 12·25 CM. CAUDAL TO THE MANUBRIUM STERNI.



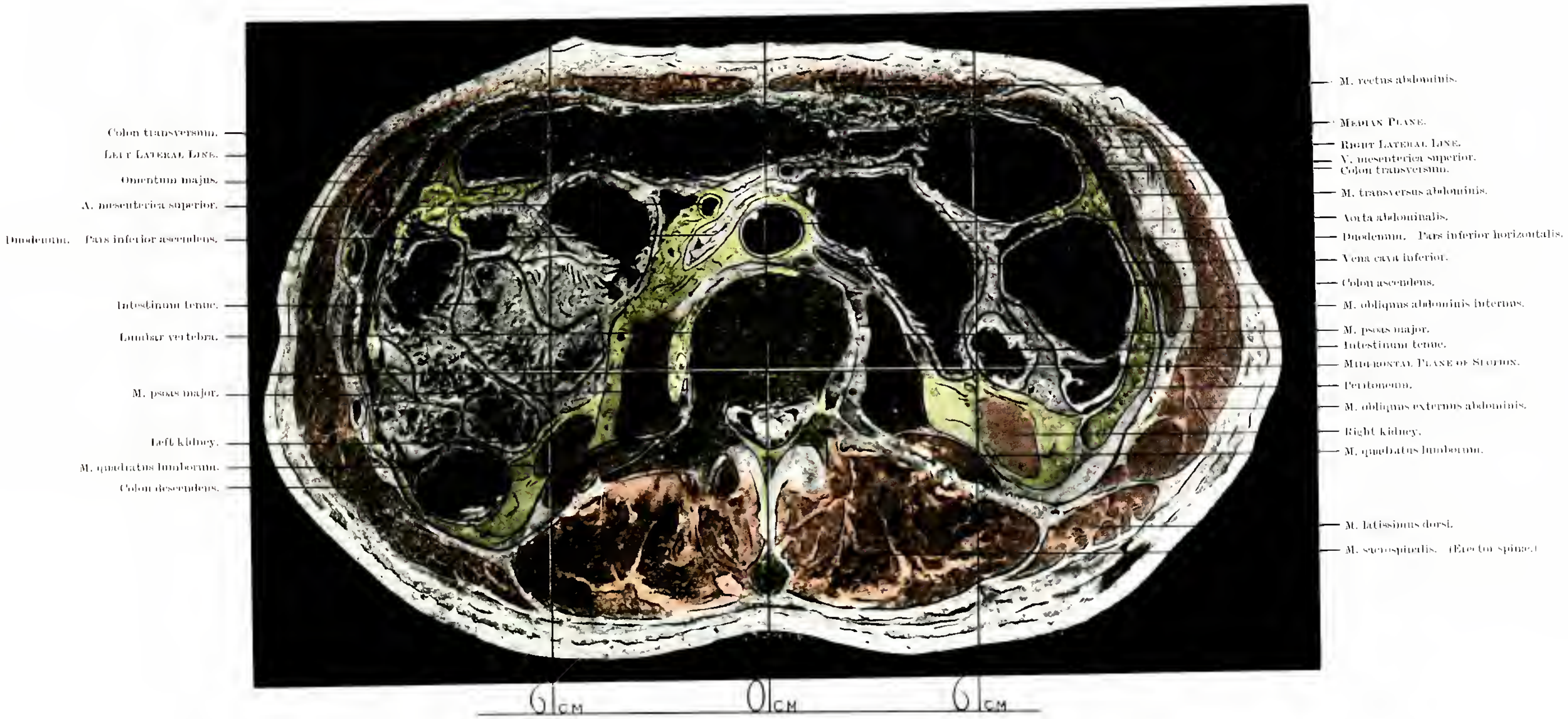
21. Section Number Five, 16·25 cm. Caudal to the Manubrium Sterni.



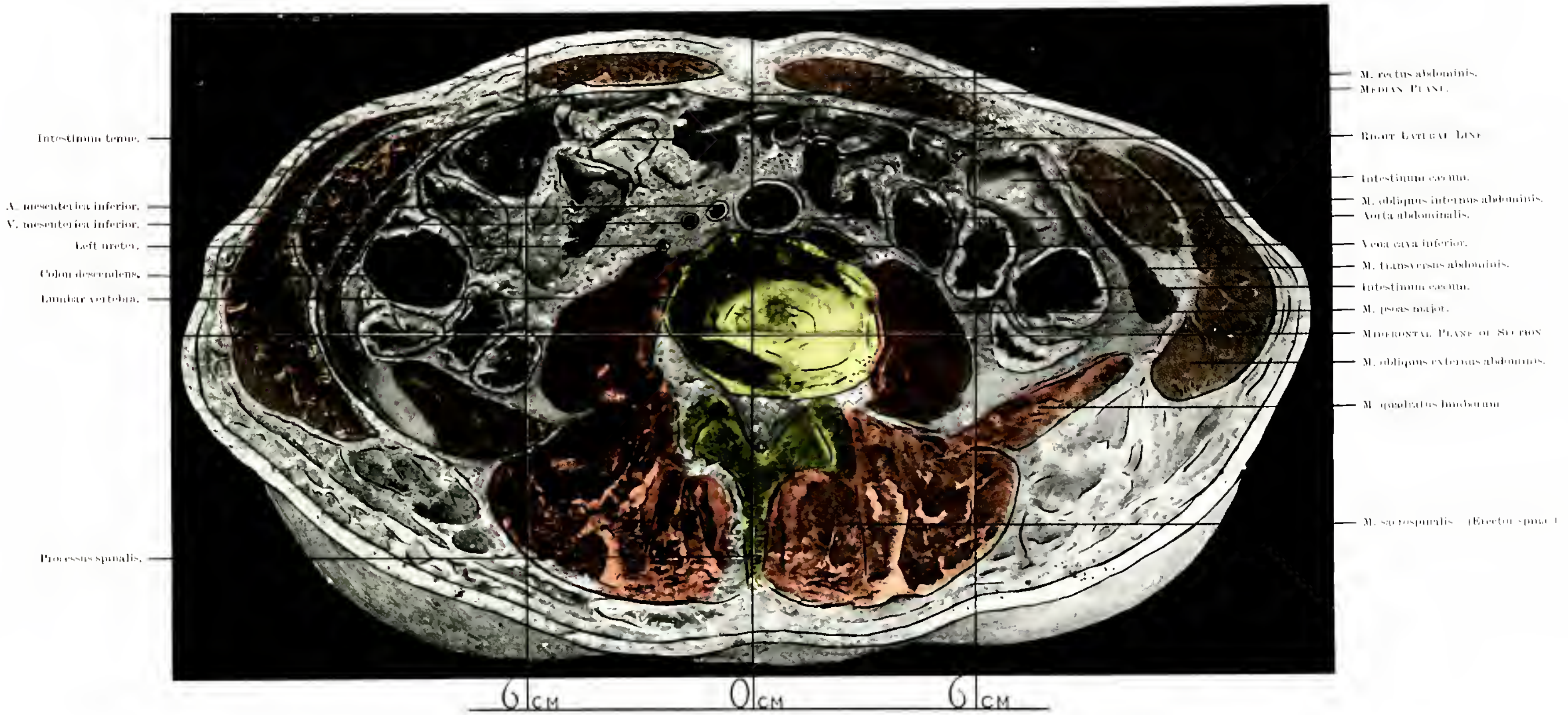
22. Section Number Six, 20·25 cm. Caudal to the Manubrium Sterni.



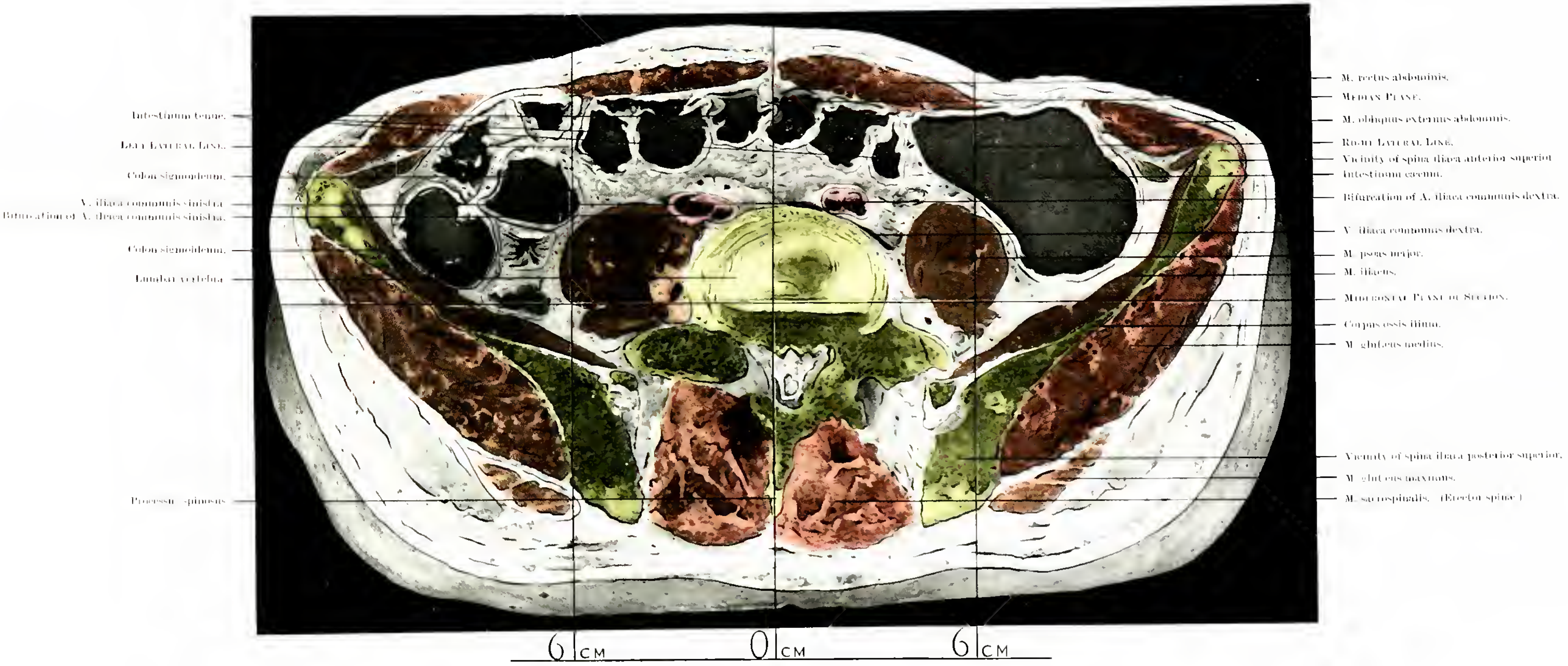
23. Section Number Seven, through the Trans-pyloric Plane, 24·50 cm. Caudal to the Manubrium Sterni.



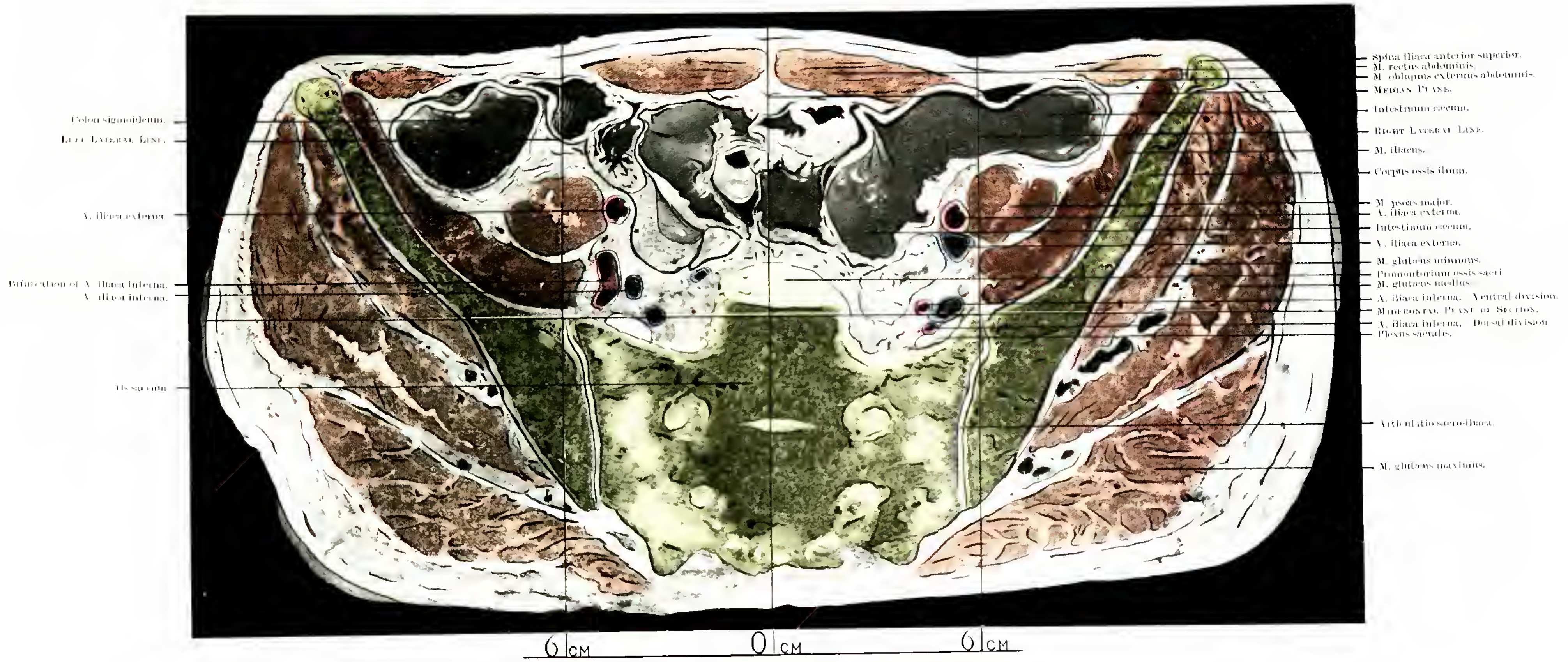
24. Section Number Eight, 28·50 cm. Caudal to the Manubrium Sterni.



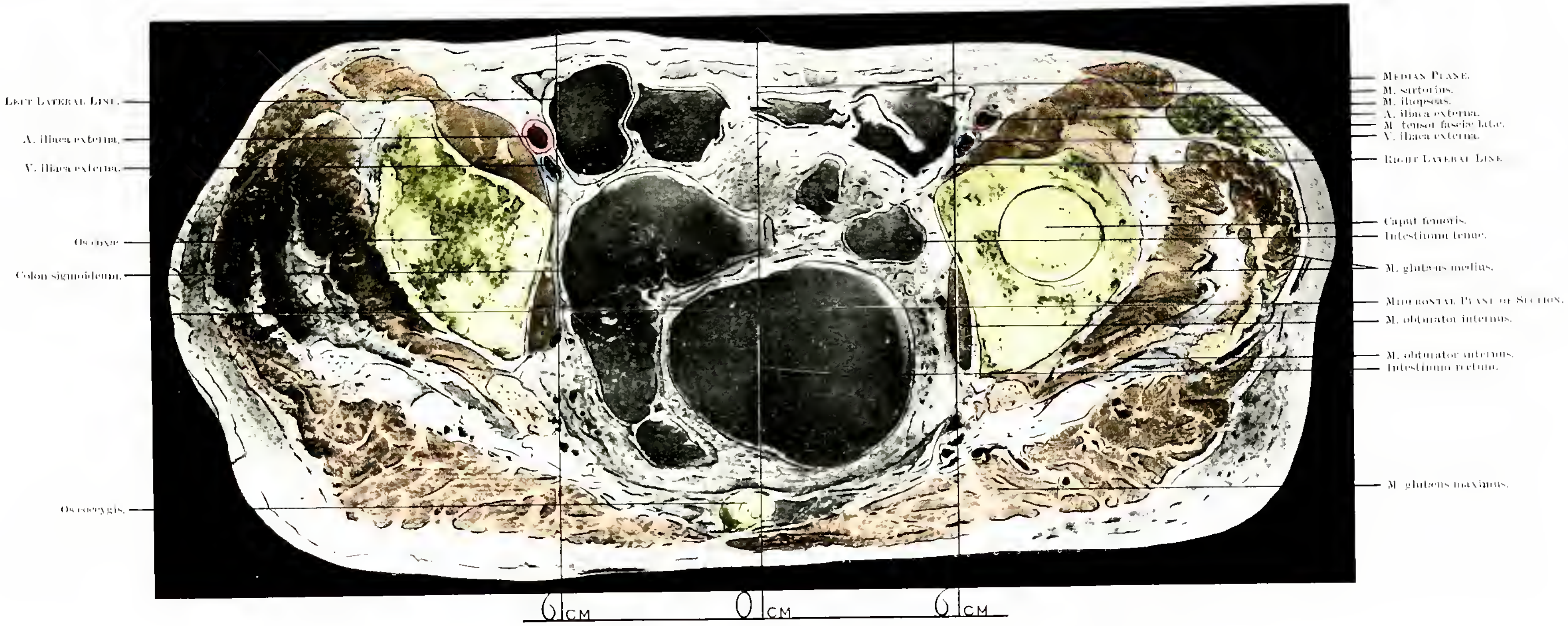
25. Section Number Nine, 32·50 cm. Caudal to the Manubrium Sterni.


Intestinum tenue.
Left Lateral Line.
Colon sigmoideum.
V. iliaca communis sinistra
Bifurcation of A. iliaca communis sinistra.
Colon sigmoideum.
Lumbar vertebra
Processus spinosus
M. rectus abdominis.
Median Plane.
M. obliquus externus abdominis.
Right Lateral Line.
Vicinity of spina iliaca anterior superior
Intestinum caecum.
Bifurcation of A. iliaca communis dextra.
V. iliaca communis dextra.
M. psoas major.
M. iliacus.
Midfrontal Plane of Section.
Corpus ossis ilium.
M. gluteus medius.
Vicinity of spina iliaca posterior superior.
M. gluteus maximus.
M. sacrospinalis. (Erector spinae.)
6 cm
0 cm
6 cm

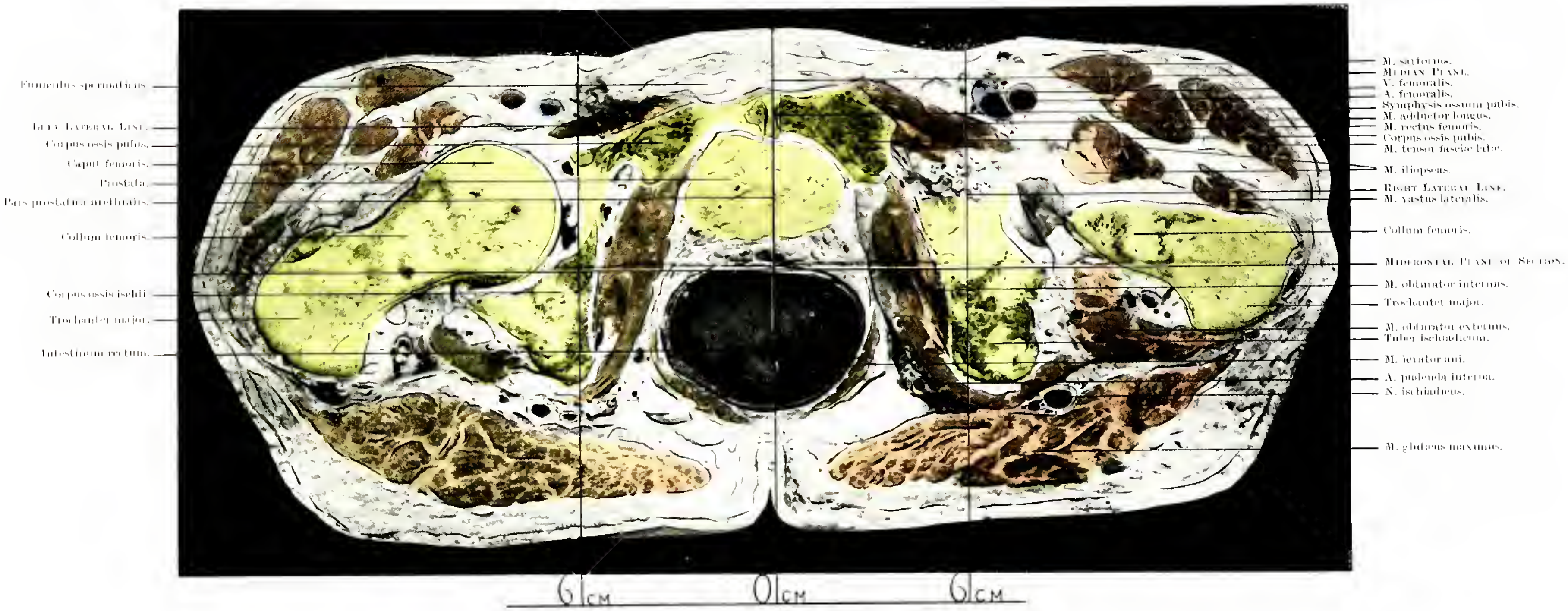
26. Section Number Ten, through the Trans-tubercular Plane, 36·75 cm. Caudal to the Manubrium Sterni.



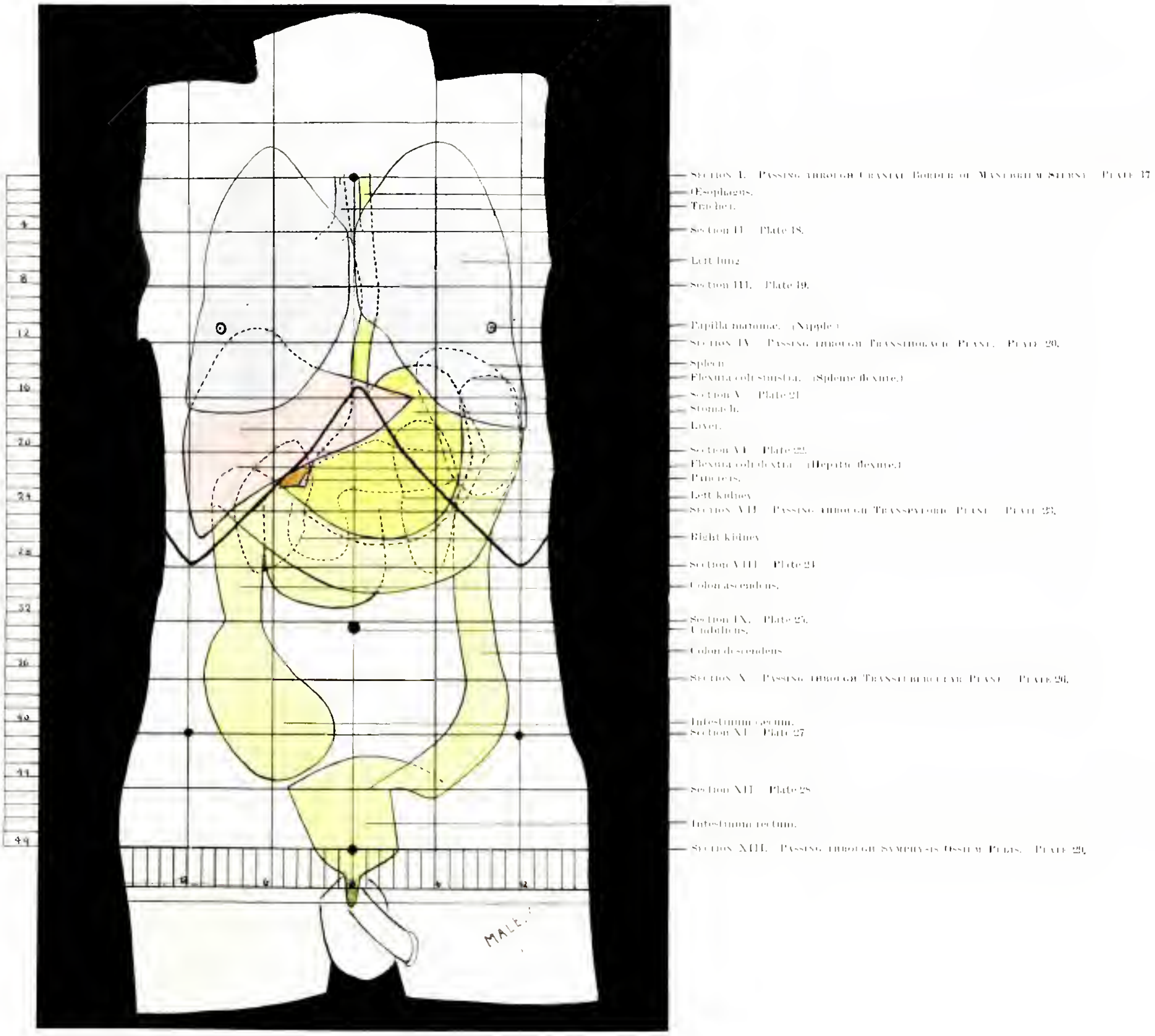
27. SECTION NUMBER ELEVEN. 40·75 CM. CAUDAL TO THE MANUBRIUM STERNI.



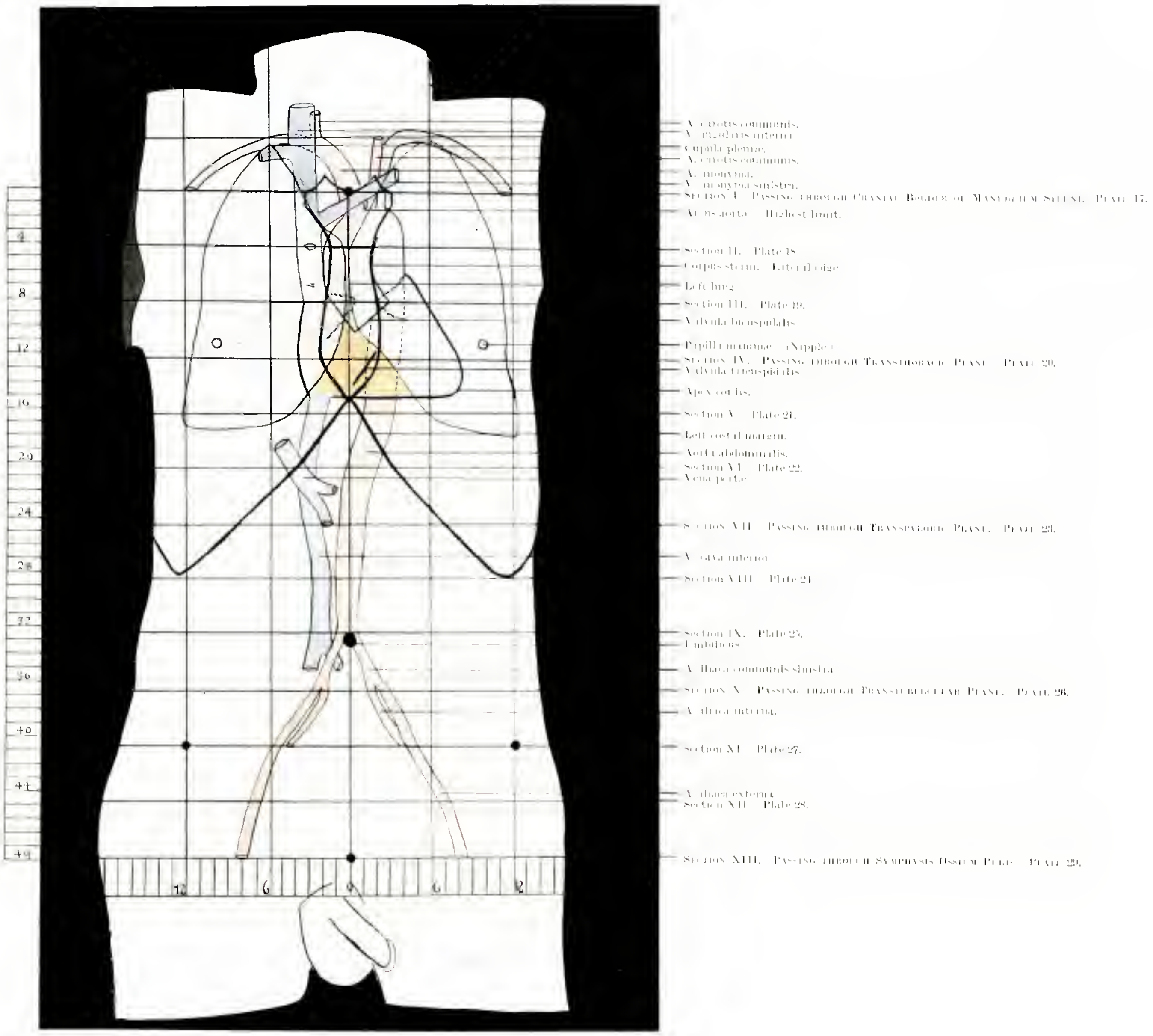
28. Section Number Twelve, 44·75 cm. Caudal to the Manubrium Sterni.



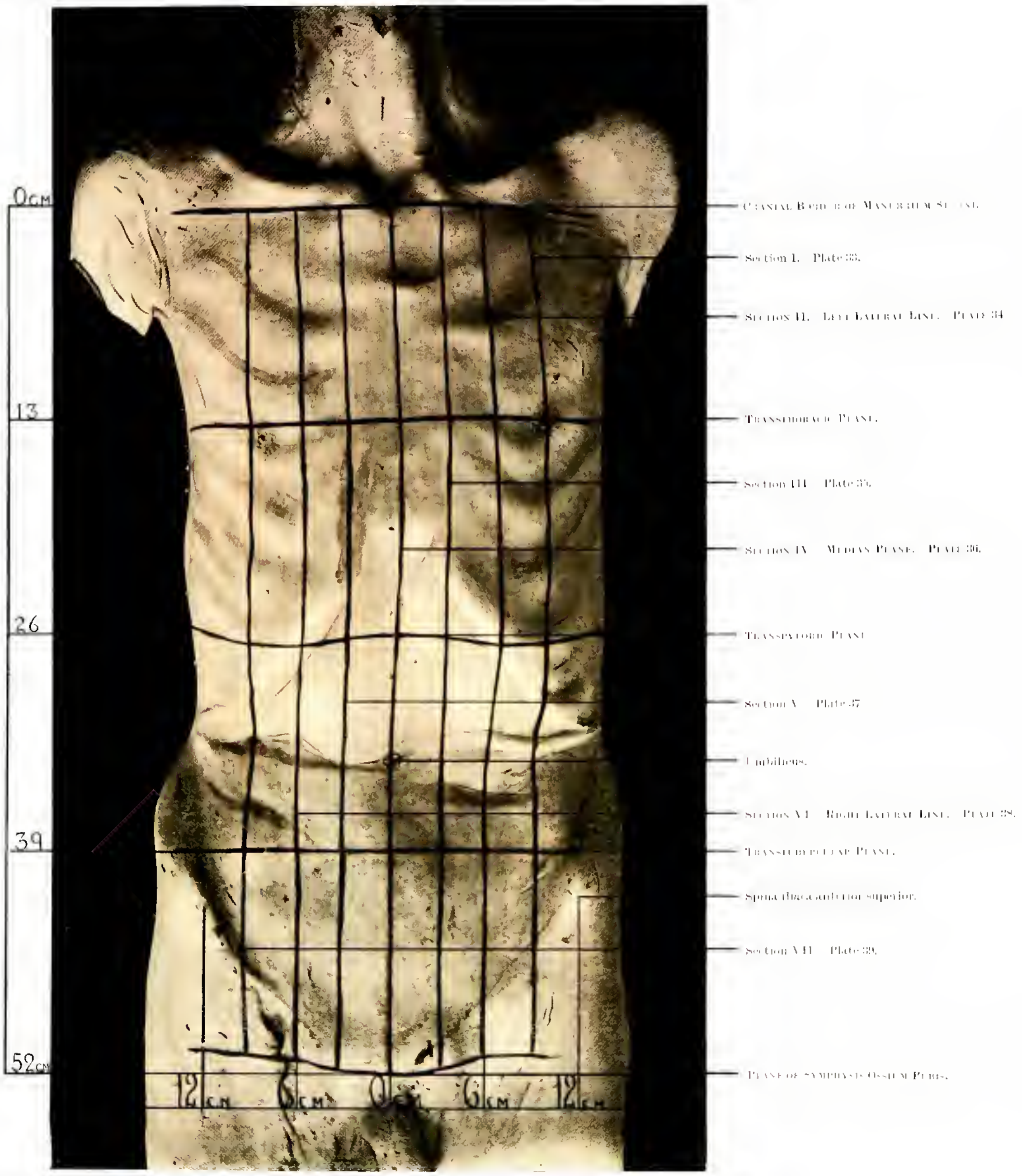
29. Section Number Thirteen, through the Trans-symphyseal Plane, 49 cm. below the Manubrium Sterni.


Section I. Passing through Cranial Border of Manubrium Sterni. Plate 17.
Œsophagus.
Trachea.
Section II. Plate 18.
Left lung.
Section III. Plate 19.
Papilla mammae. (Nipple.)
Section IV. Passing through Transthoracic Plane. Plate 20.
Spleen.
Flexura coli sinistra. (Splenic flexure.)
Section V. Plate 21.
Stomach.
Liver.
Section VI. Plate 22.
Flexura coli dextra. (Hepatic flexure.)
Pancreas.
Left kidney.
Section VII. Passing through Transpyloric Plane. Plate 23.
Right kidney.
Section VIII. Plate 24.
Colon ascendens.
Section IX. Plate 25.
Umbilicus.
Colon descendens.
Section X. Passing through Transtubercular Plane. Plate 26.
Intestinum caecum.
Section XI. Plate 27.
Section XII. Plate 28.
Intestinum rectum.
Section XIII. Passing through Symphysis Ossium Pubis. Plate 29.
4
8
12
16
20
24
28
32
36
40
44
48
12
6
6
12
MALE.

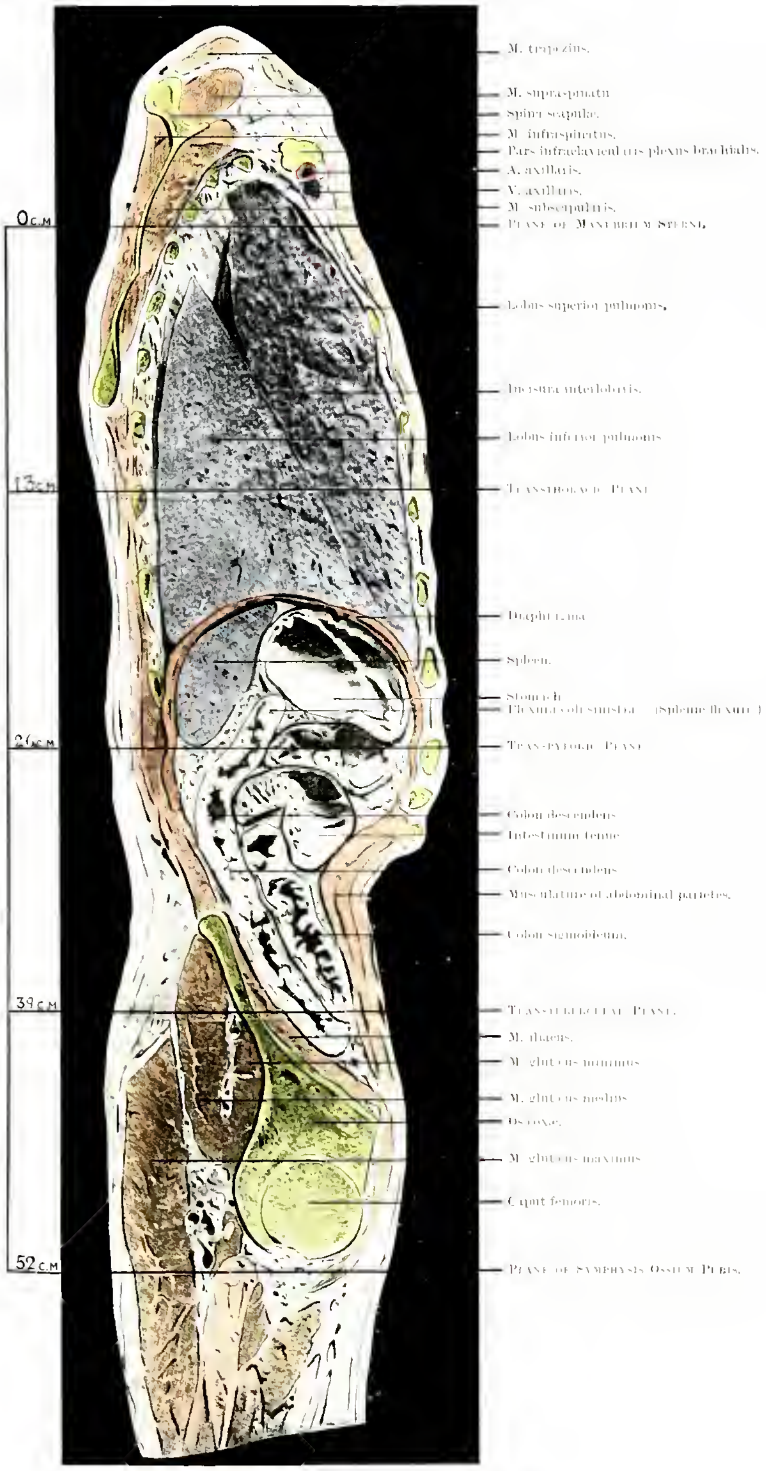
30. Reconstruction of the Trunk, showing the Surface Positions of the Viscera projected on to the Body from the Sections, Addison's Lines, the Planes of Sections, the more important Osseous Landmarks, and the Vertical and Horizontal Centimetre Scales.



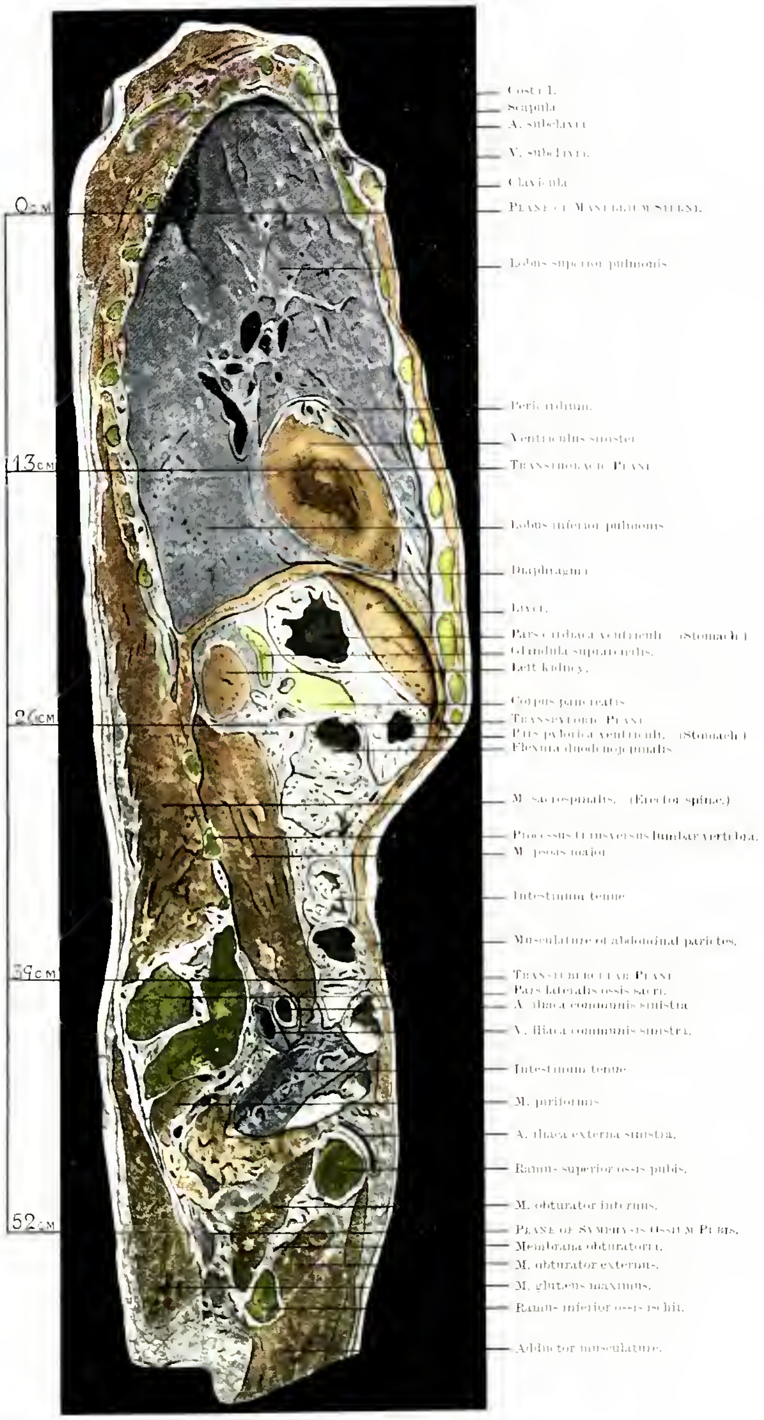
31. A similar Reconstruction showing the Surface Positions of the Heart and Chief Blood-Vessels Projected on to the Body from the Sections. Other Details as under Plate 30.


0cm
13
26
39
52cm
12cm
6cm
0cm
6cm
12cm
Cranial Border of Manubrium Sterni.
Section I. Plate 33.
Section II. Left Lateral Line. Plate 34
Transthoracic Plane.
Section III. Plate 35.
Section IV. Median Plane. Plate 36.
Transpyloric Plane
Section V. Plate 37
Umbilicus.
Section VI. Right Lateral Line. Plate 38.
Transtubercular Plane.
Spina iliaca anterior superior.
Section VII. Plate 39.
Plane of Symphysis Ossium Pubis.

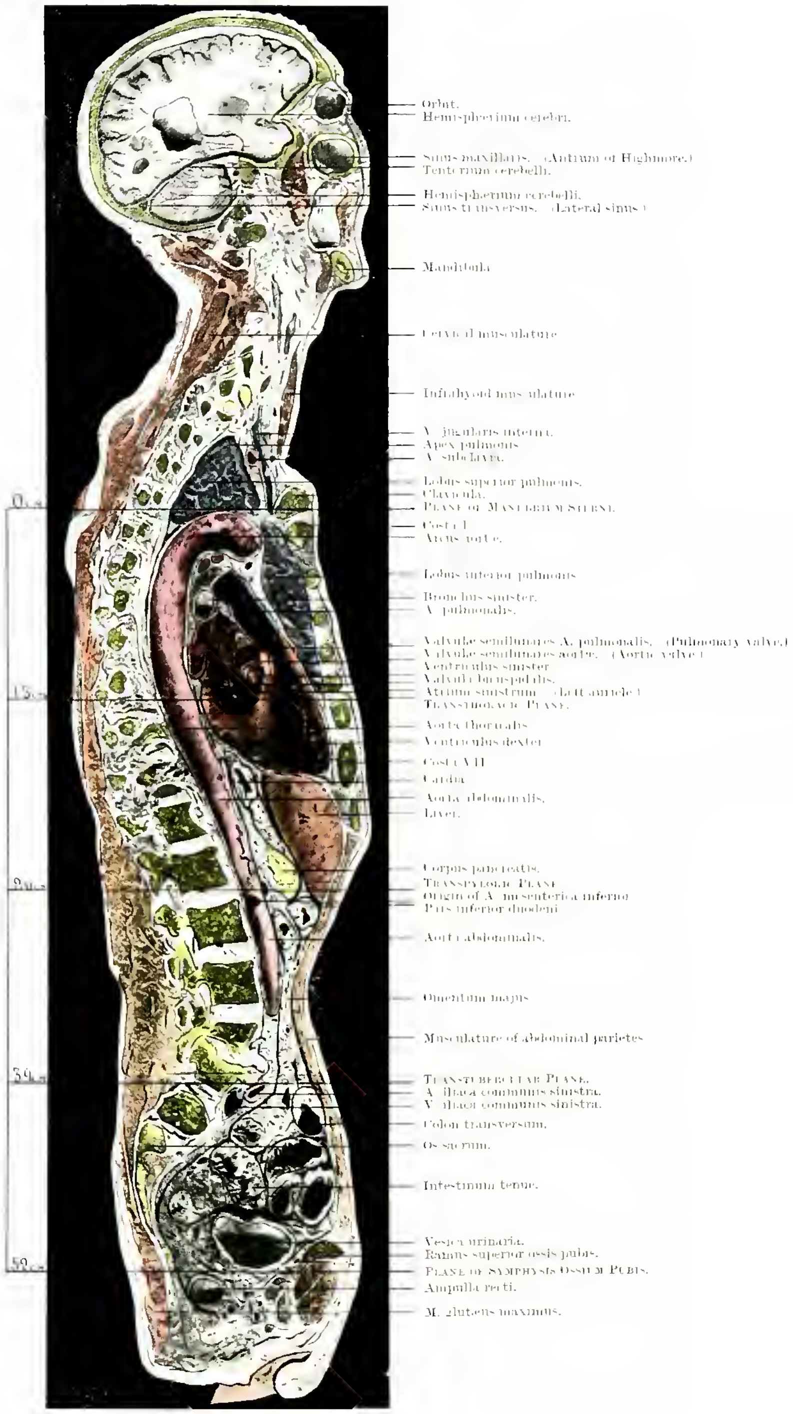
32. Ventral View of the Trunk, showing Addison's Lines, the Planes of Sections, the more important Osseous Landmarks, and the Vertical and Horizontal Centimetre Scales.



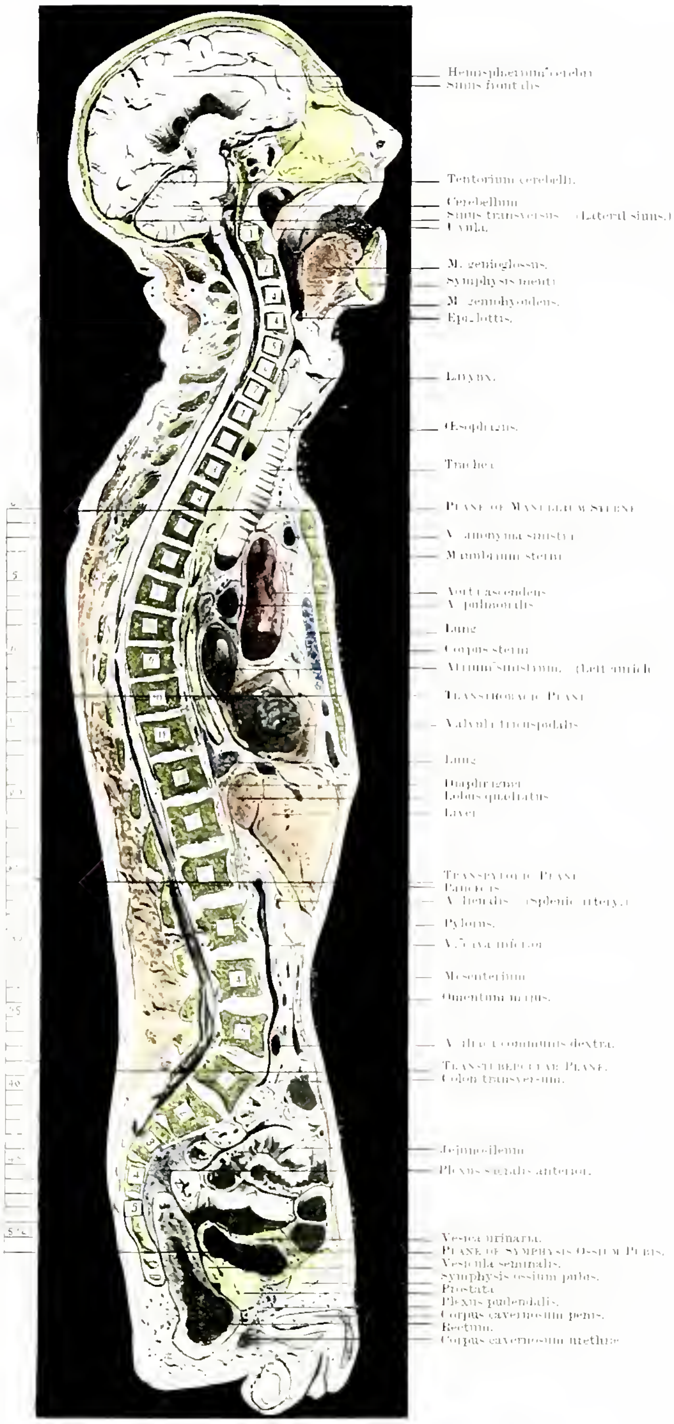
33. Section Number One, 9 cm. to the Left of the Median Plane viewed from the Right.



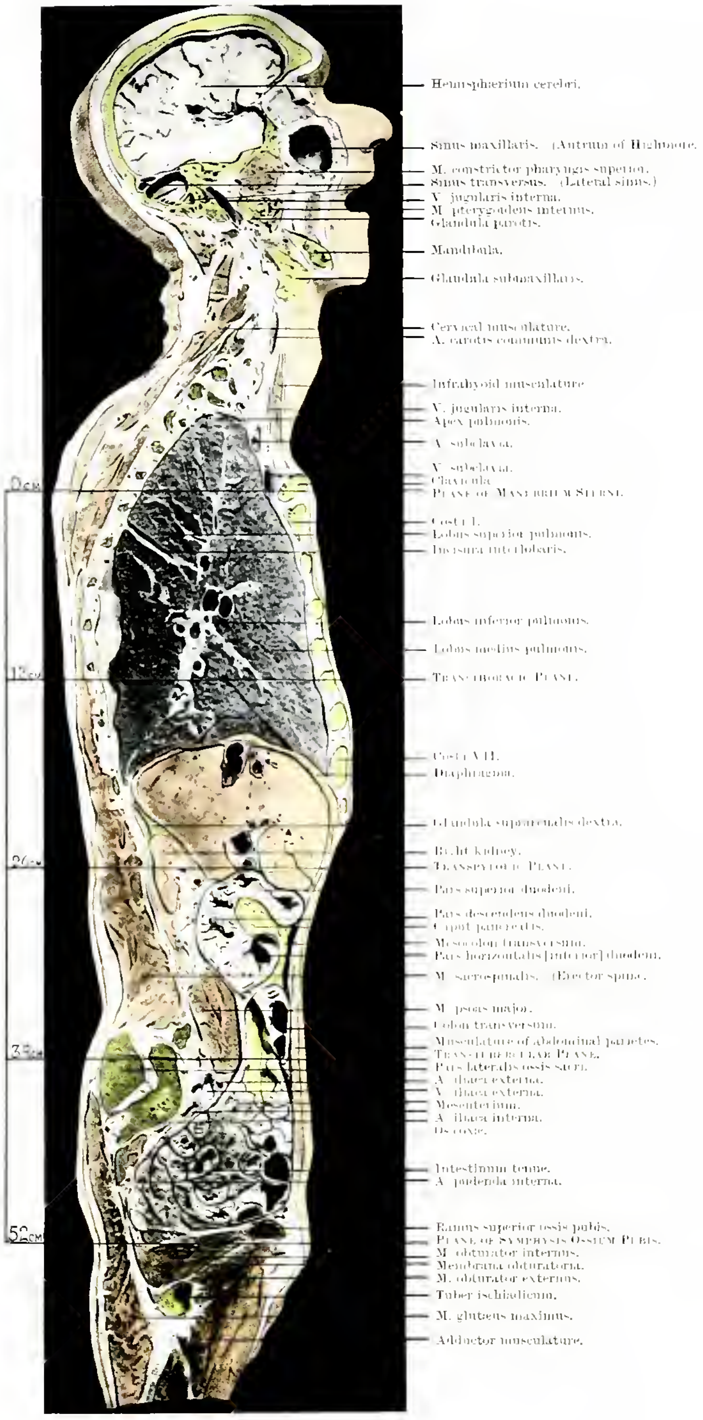
34. Section Number Two, through the Left Lateral Line, 6 cm. to the Left of the Median Plane viewed from the Right.



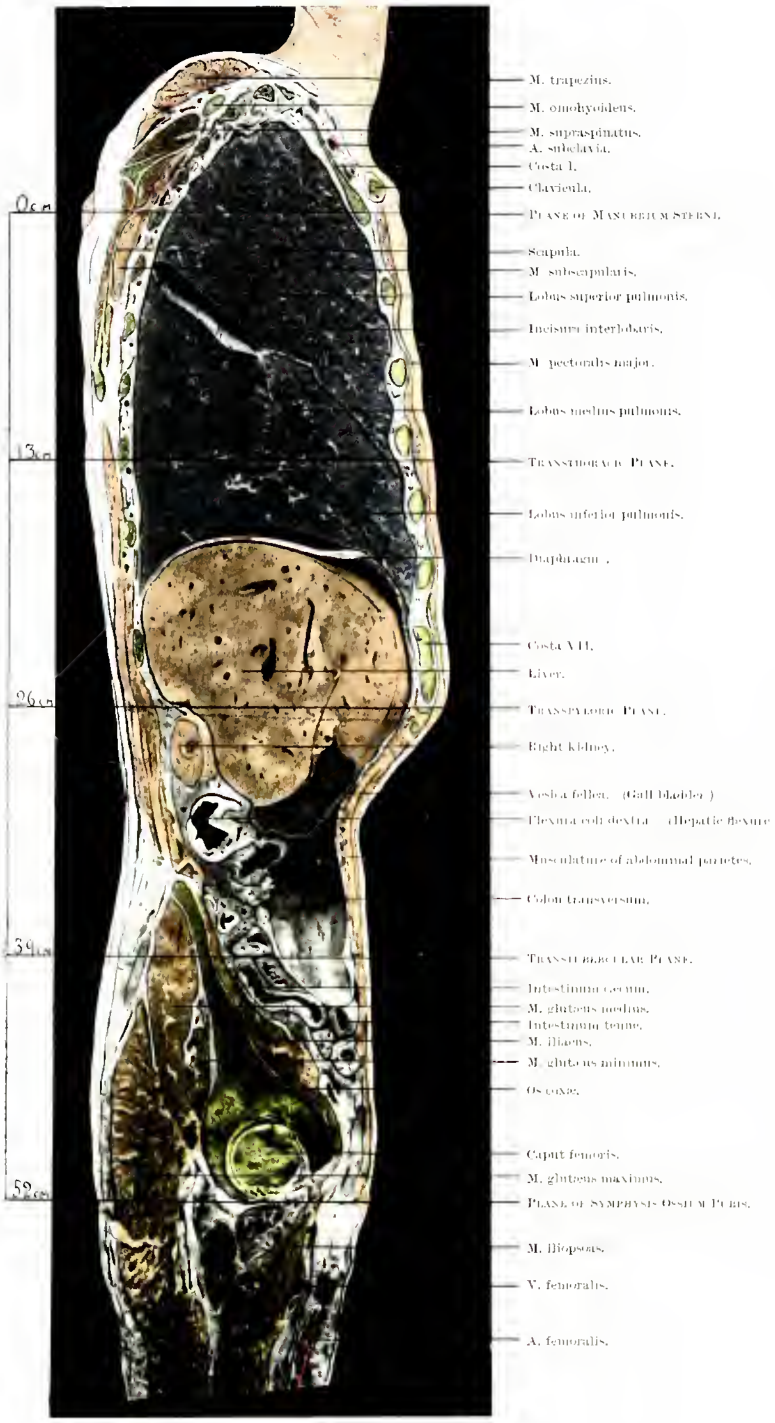
35. SECTION NUMBER THREE. 3 CM. TO THE LEFT OF THE MEDIAN PLANE VIEWED FROM THE RIGHT.



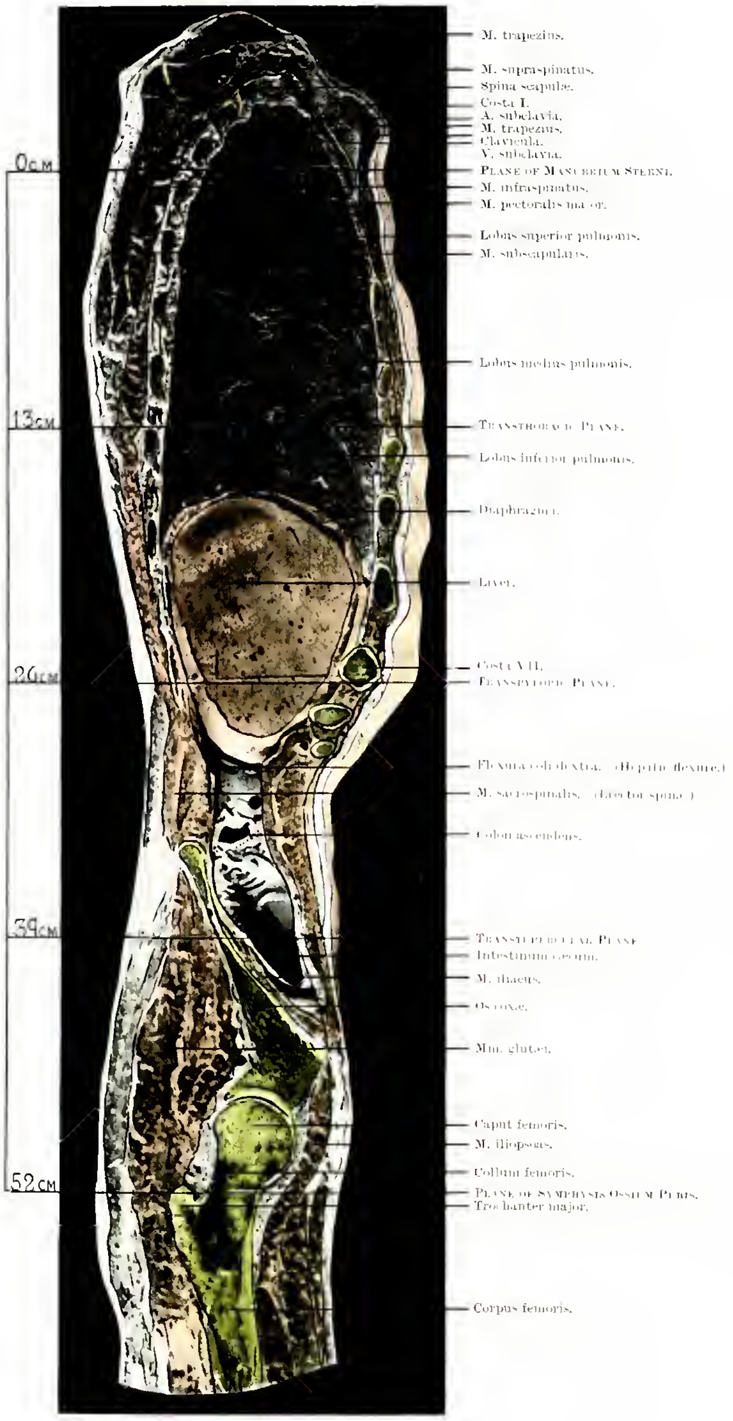
36. SECTION NUMBER FOUR, THROUGH THE MEDIAN PLANE VIEWED FROM THE RIGHT.



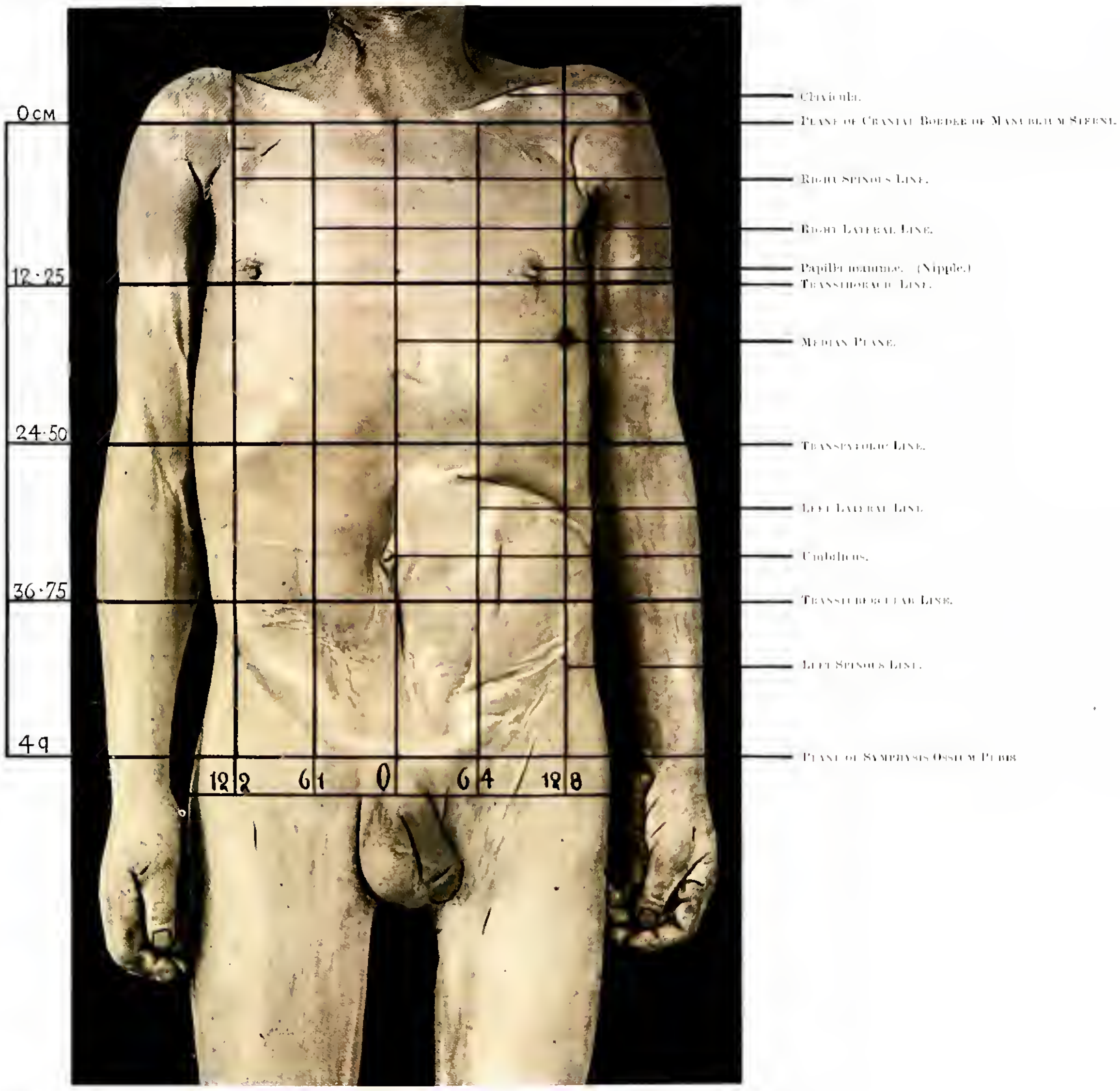
37. Section Number Five, 3 cm. to the Right of the Median Plane viewed from the Right.



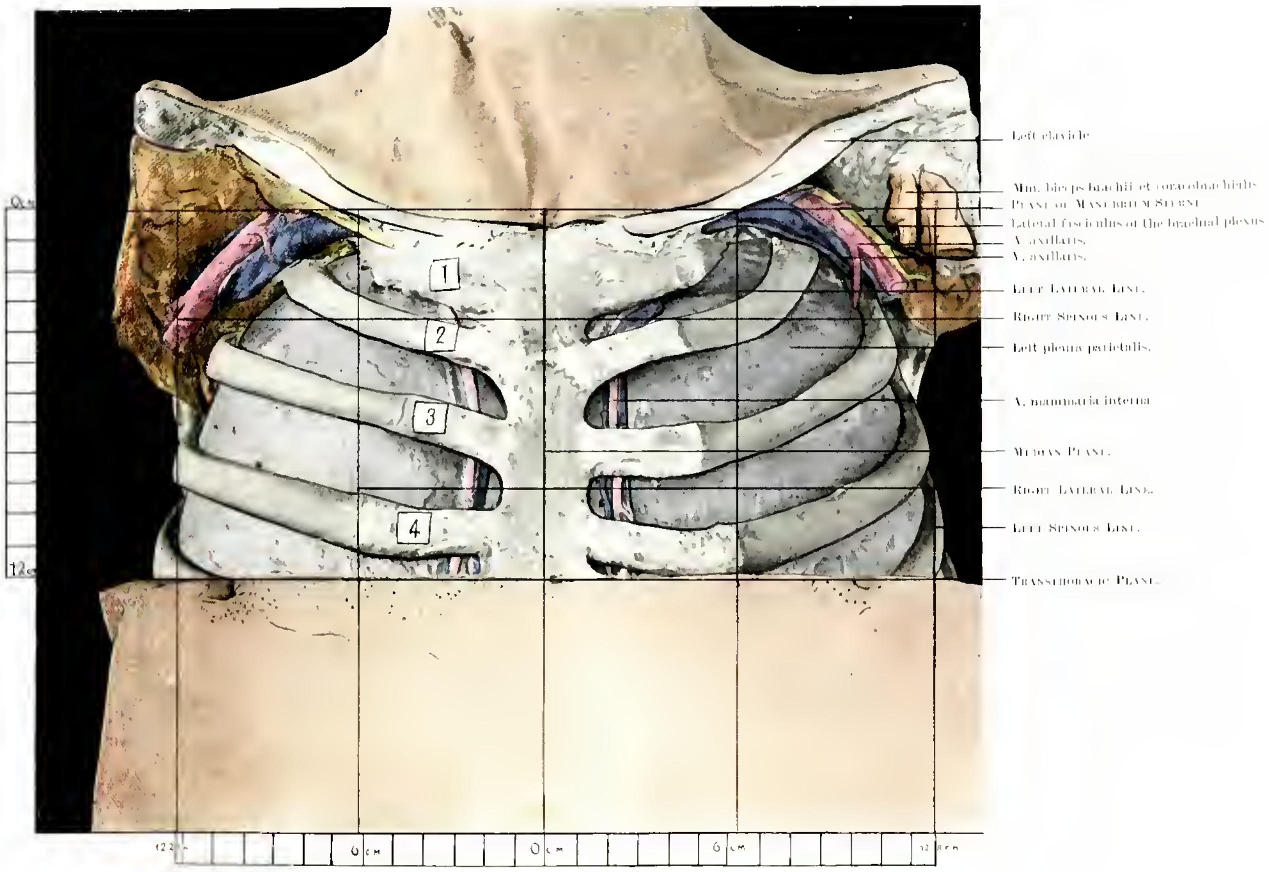
38. Section Number Six, through the Right Lateral Line, 6 cm. to the Right of the Median Plane viewed from the Right.



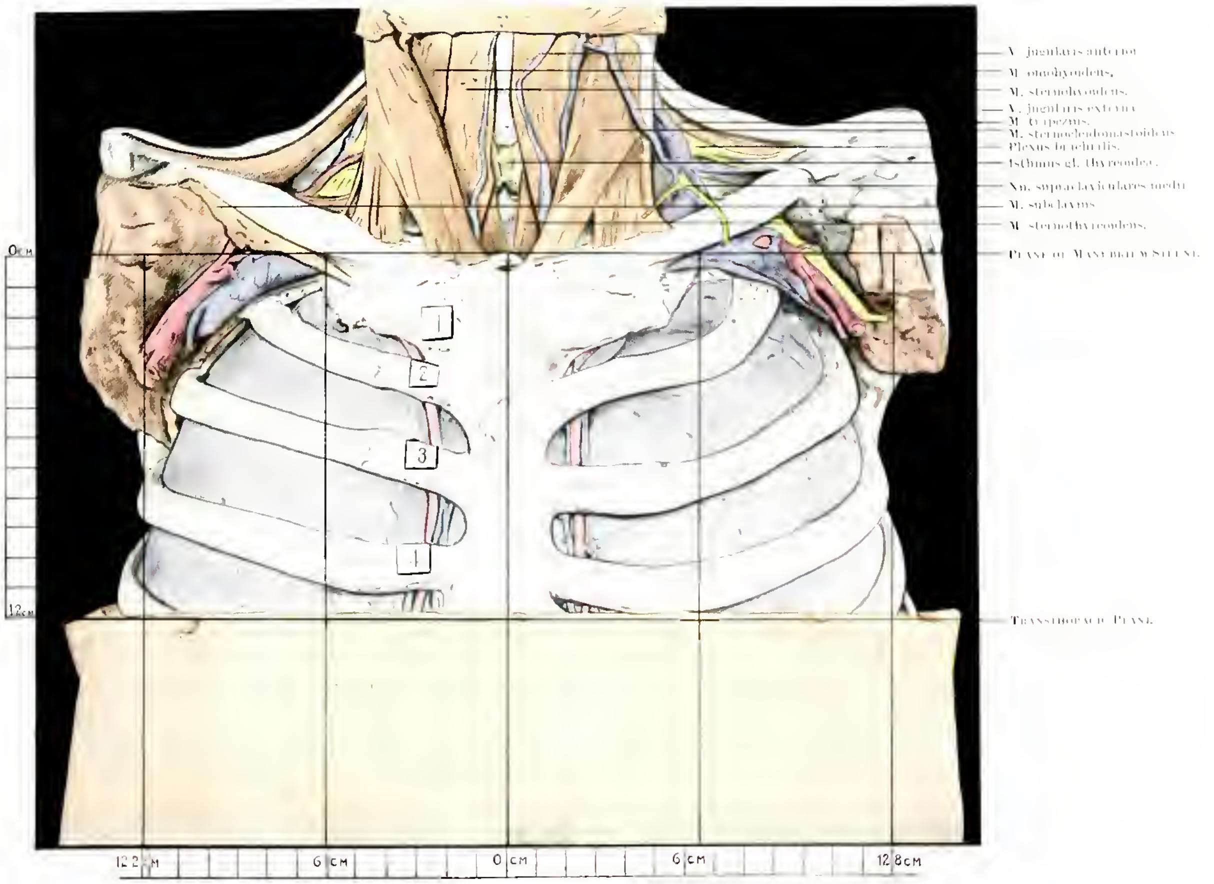
39. SECTION NUMBER SEVEN, 9 CM. TO THE RIGHT OF THE MEDIAN PLANE VIEWED FROM THE RIGHT.



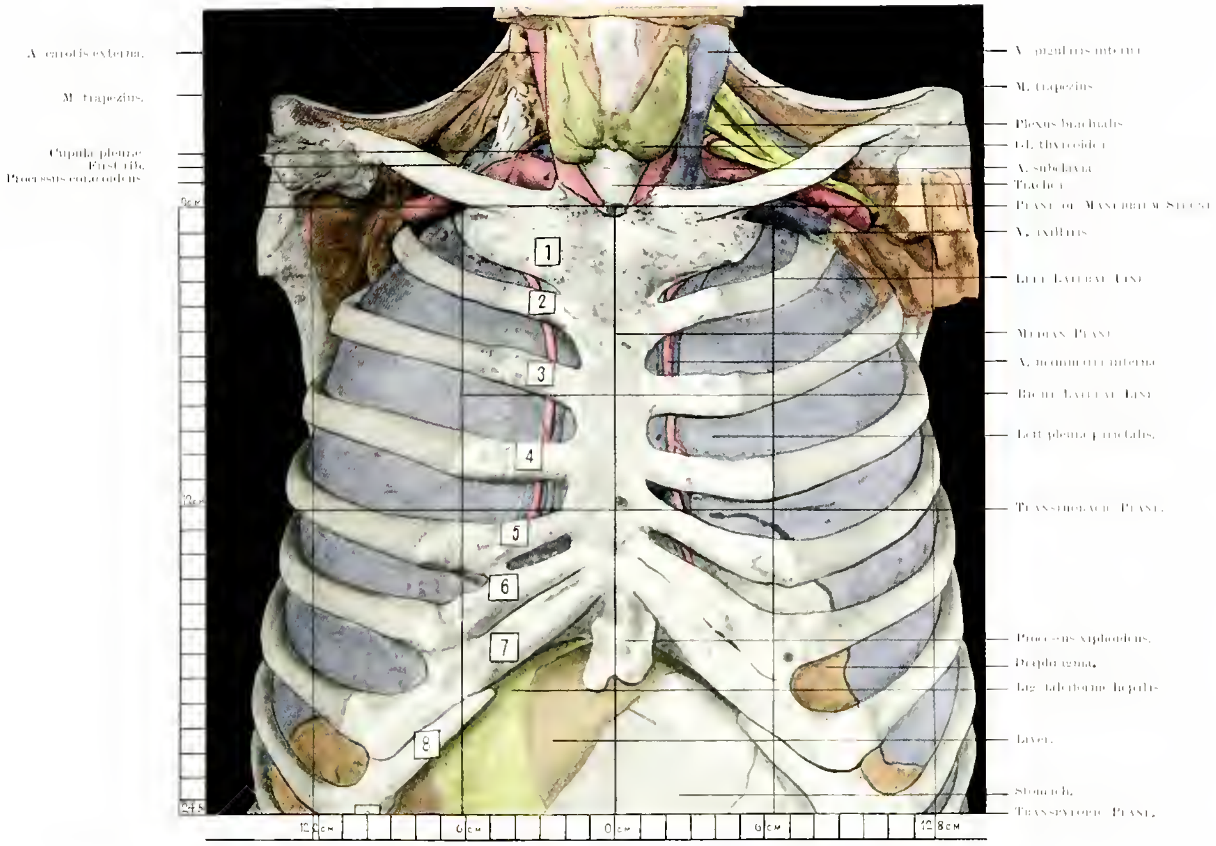
40. Ventral View of the Trunk, showing Addison's Lines, the Planes between which the several Dissections are made, the more important Osseous Landmarks, and the Vertical and Horizontal Centimetre Scales.



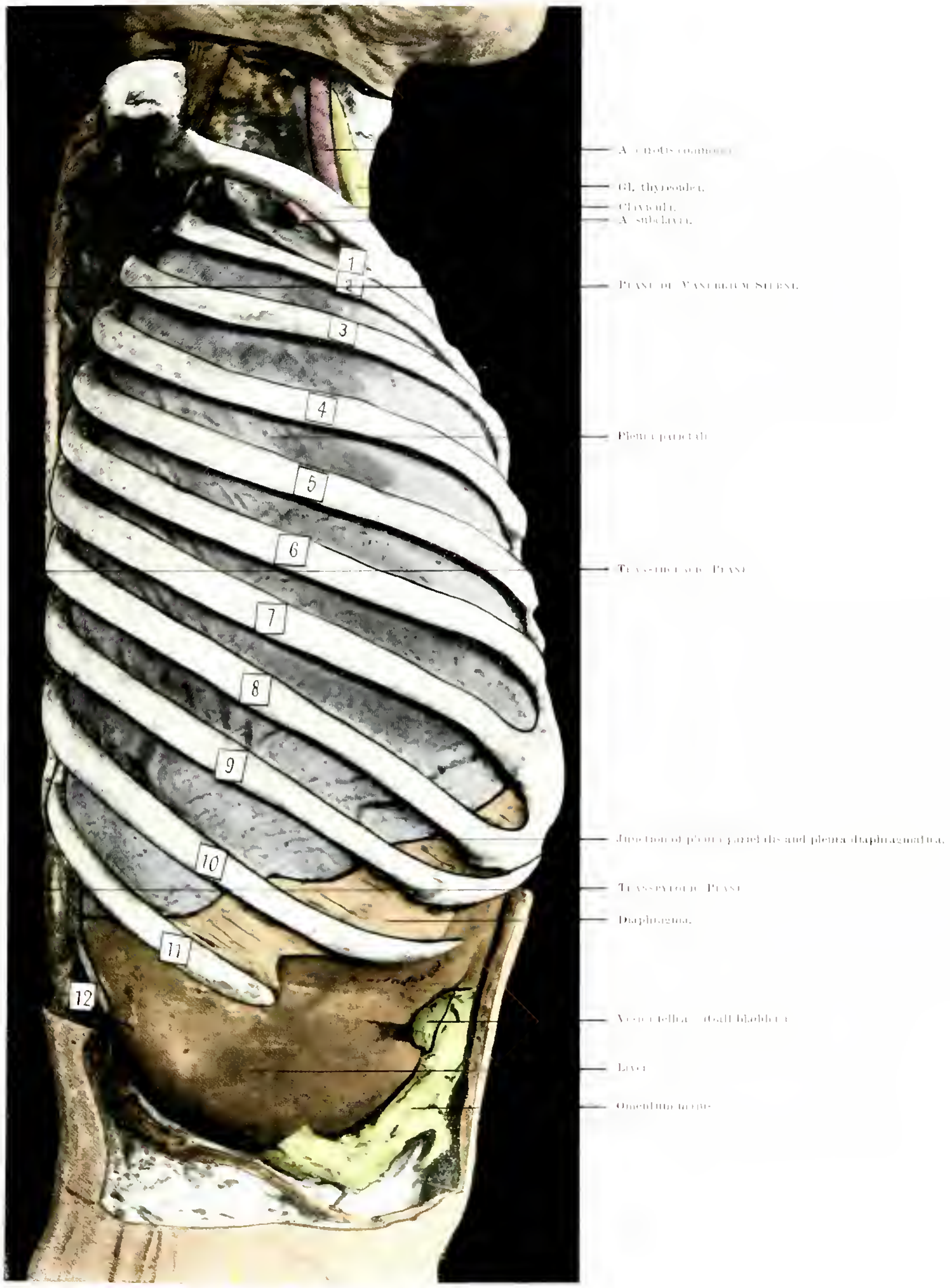
41. Ventral Dissection of the Cranial Quarter of the Trunk.



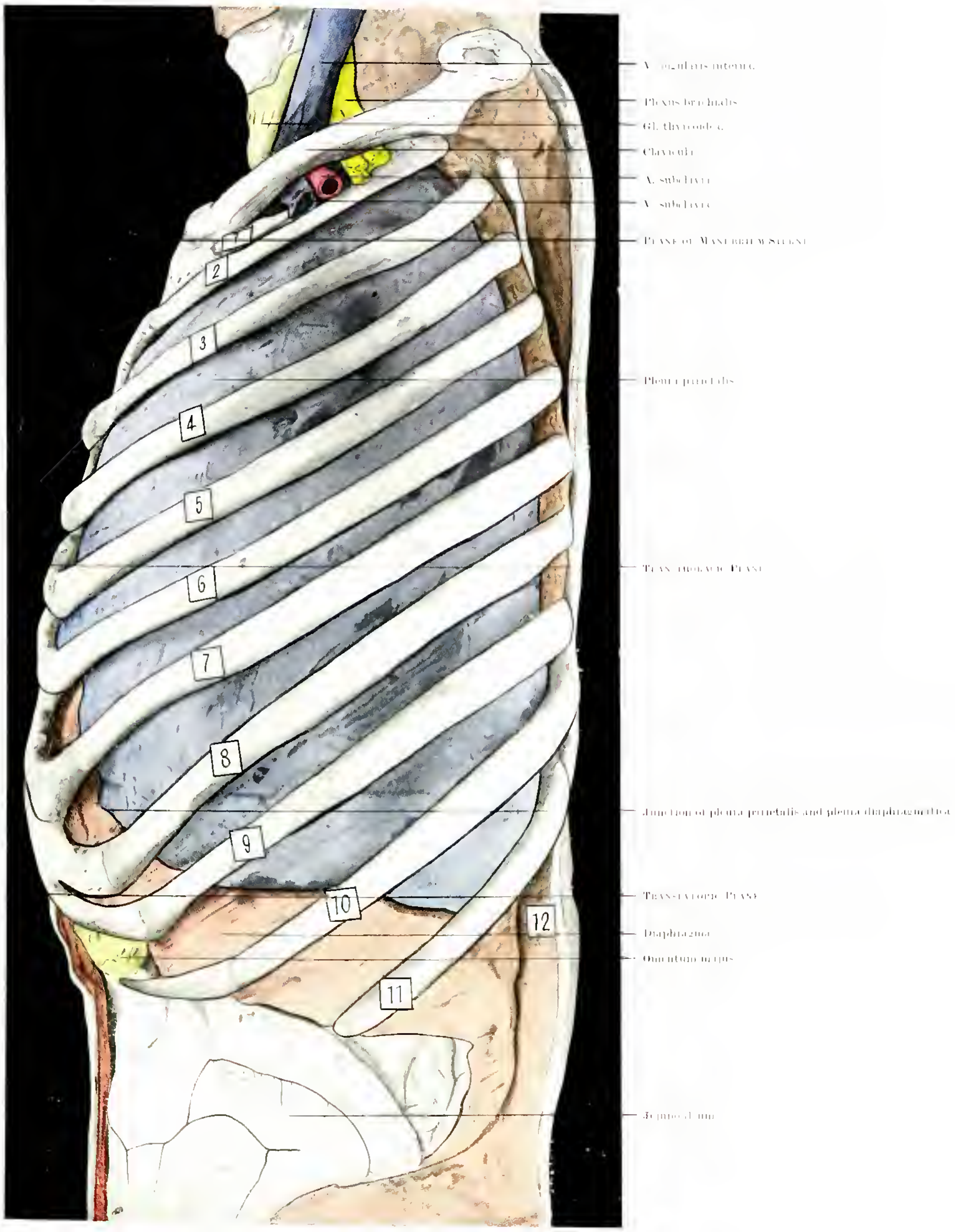
42. The same Dissection extended to the Neck.



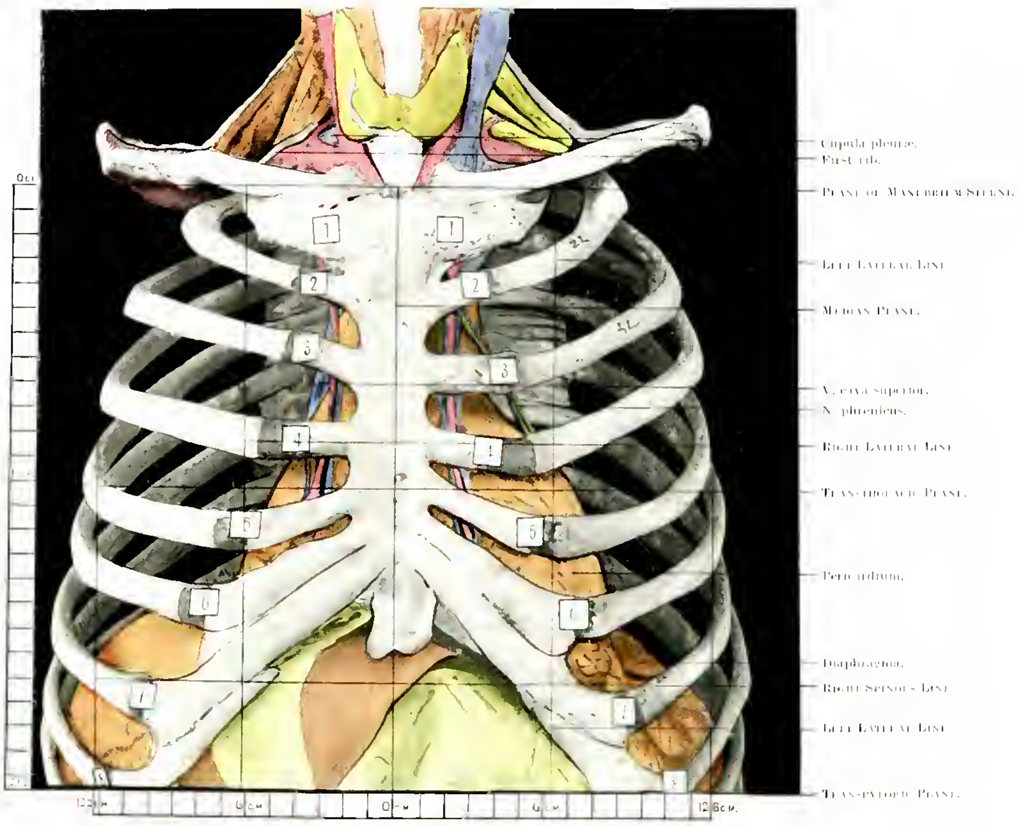
43. Ventral Dissection of the Cranial Half of the Trunk.



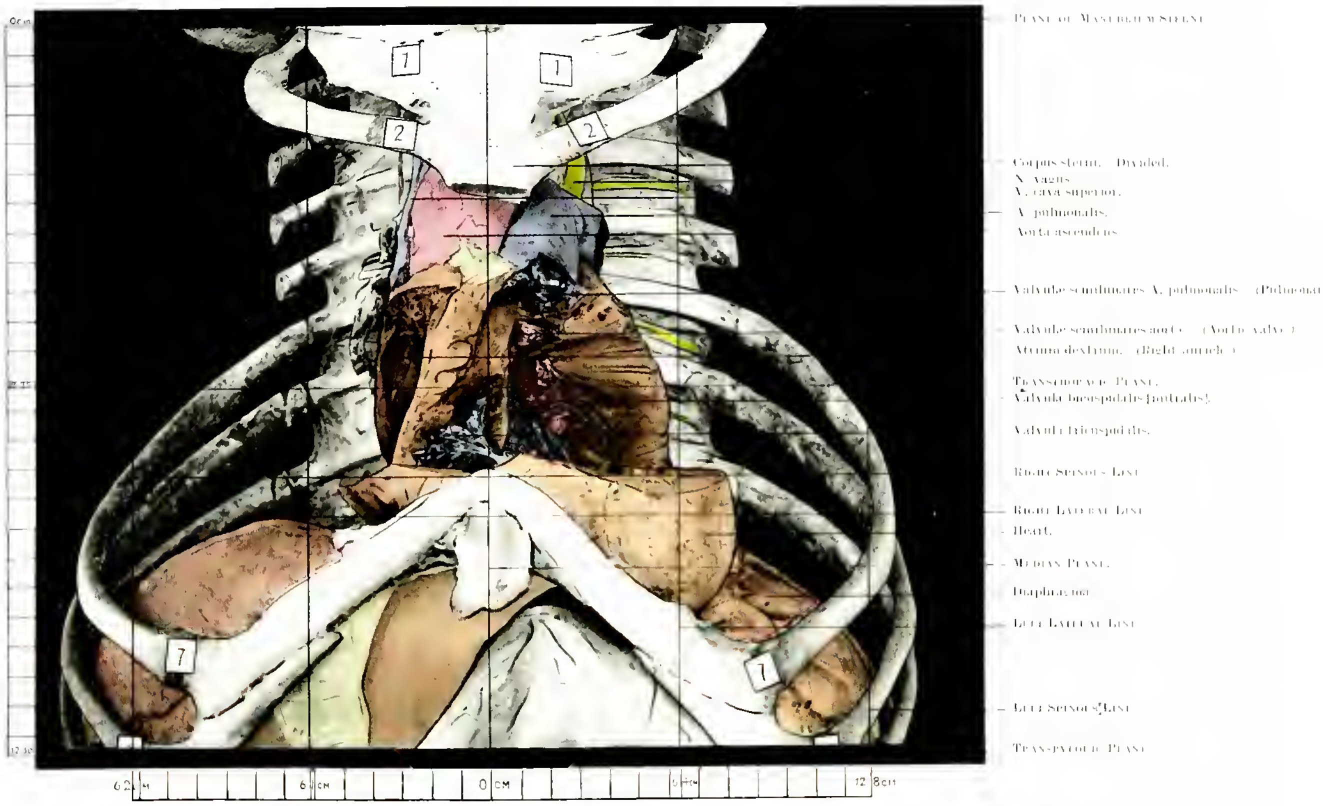
44. Dissection of the Right Pleura Parietalis from the Right.



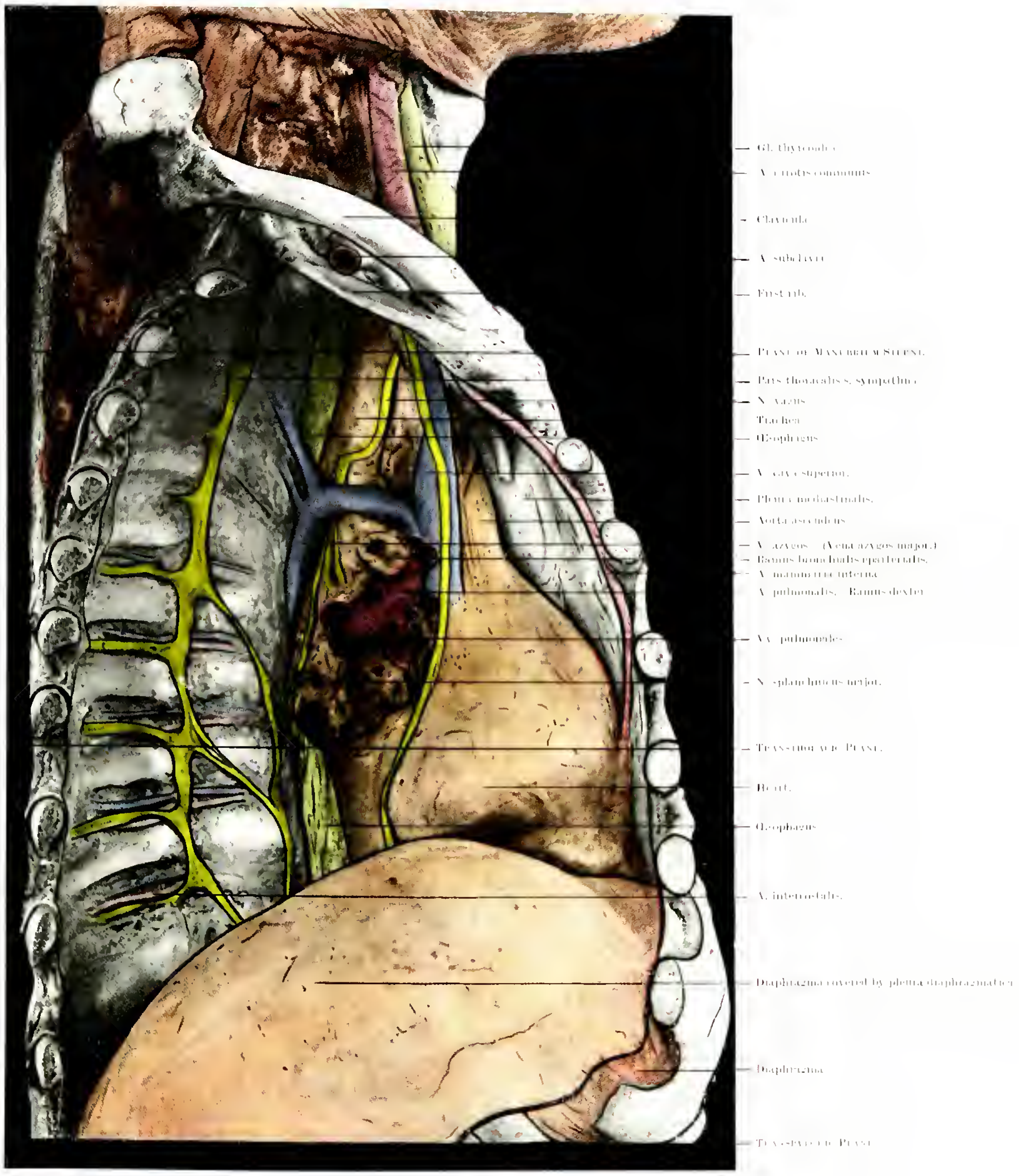
45. Dissection of the Left Pleura Parietalis from the Left.



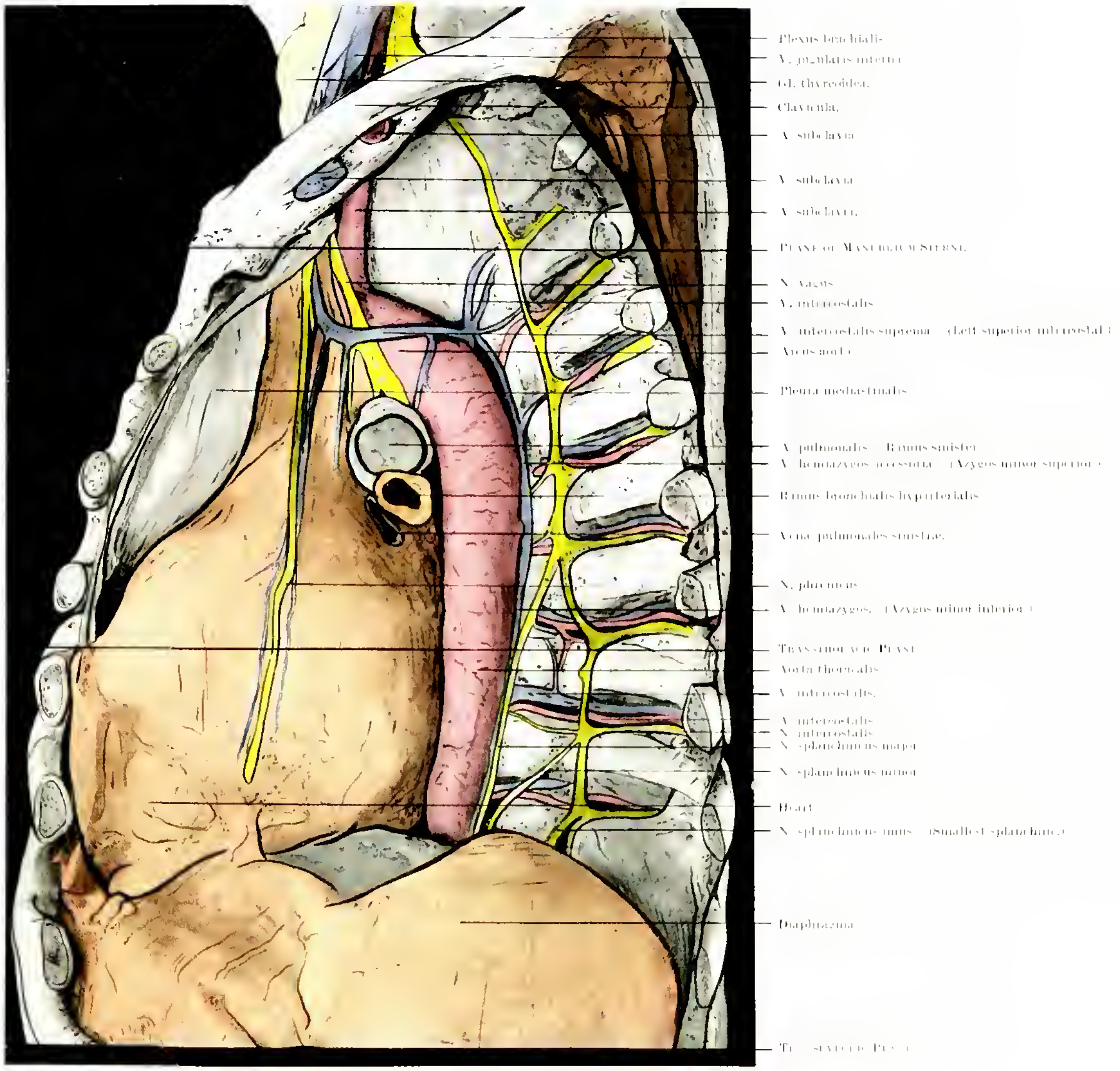
46. THE HEART AND PERICARDIUM IN SITU AFTER REMOVAL OF THE LUNGS.



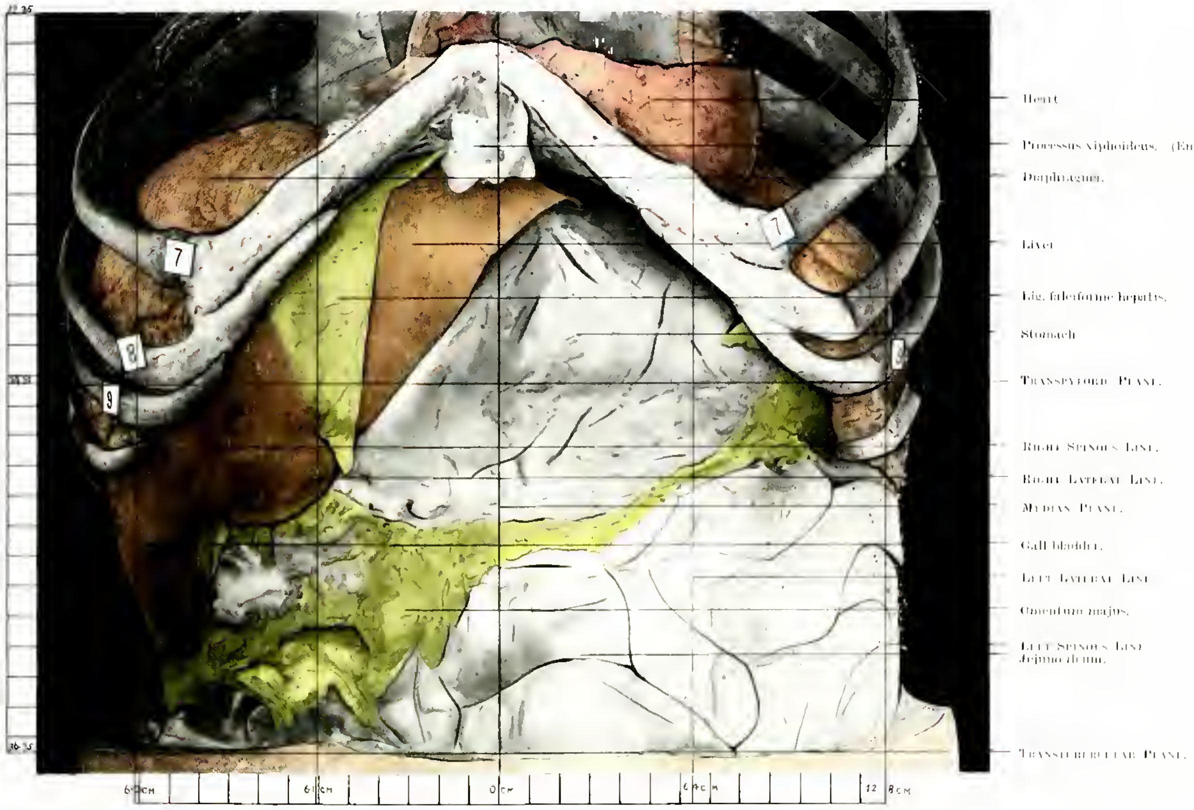
47. Dissection of the Valves of the Heart in Situ.



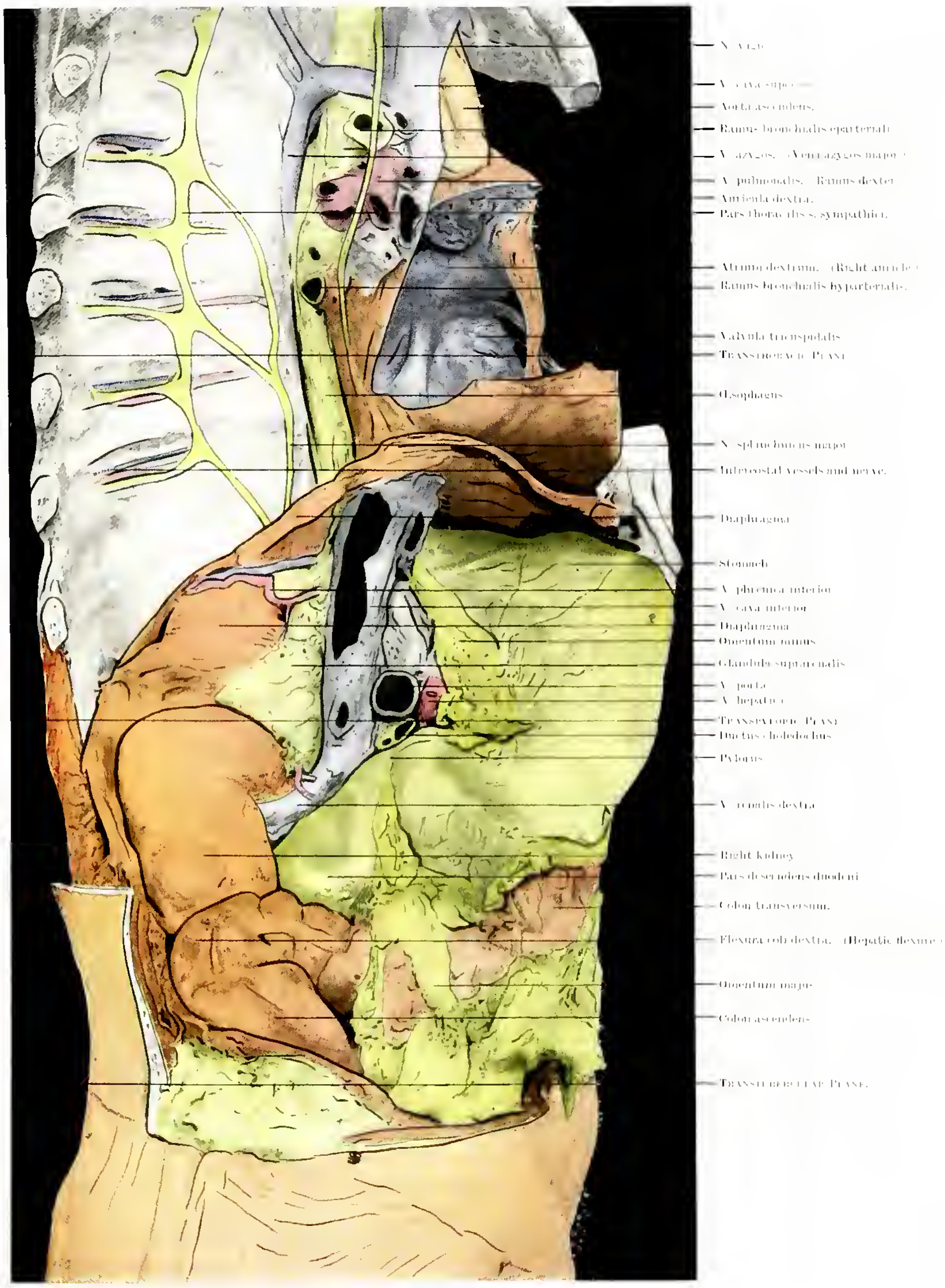
48. Dissection of the Right Side of the Cavum Thoracis after Removal of the Right Lung.



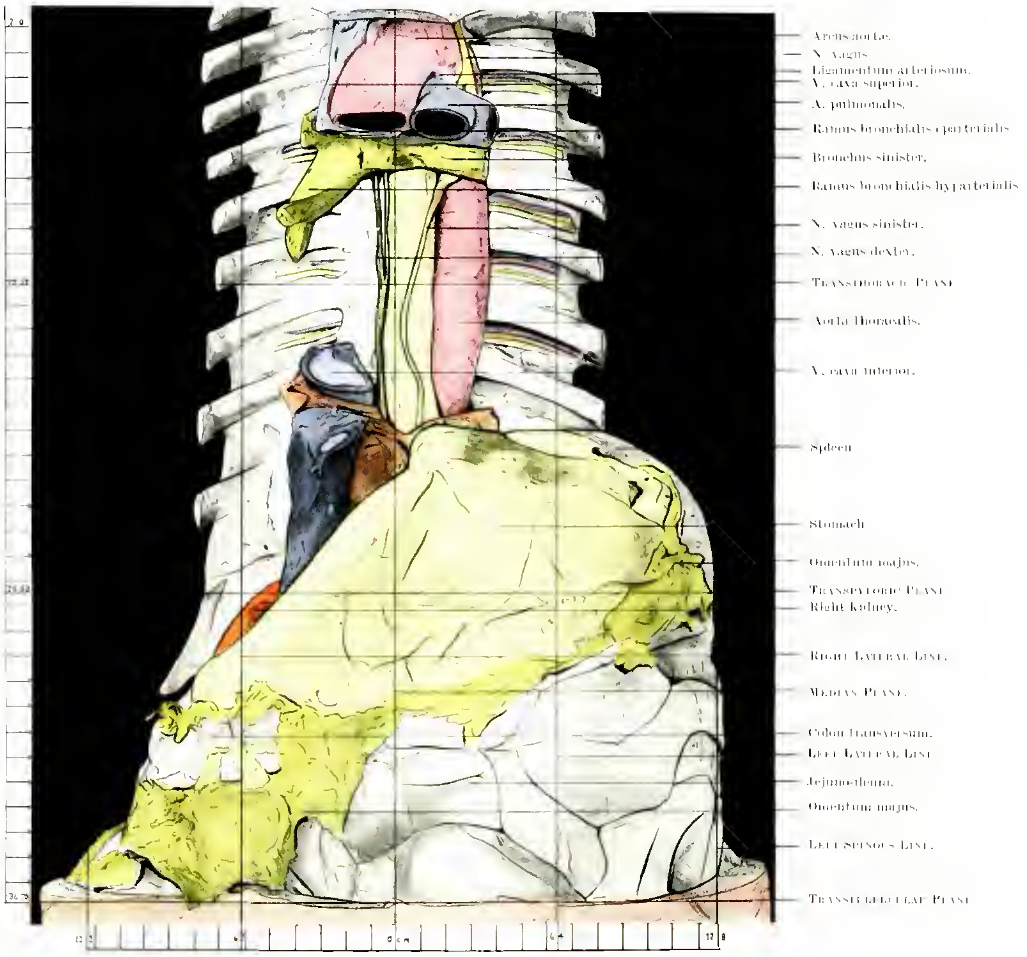
49. Dissection of the Left Side of the Cavum Thoracis after Removal of the Left Lung.



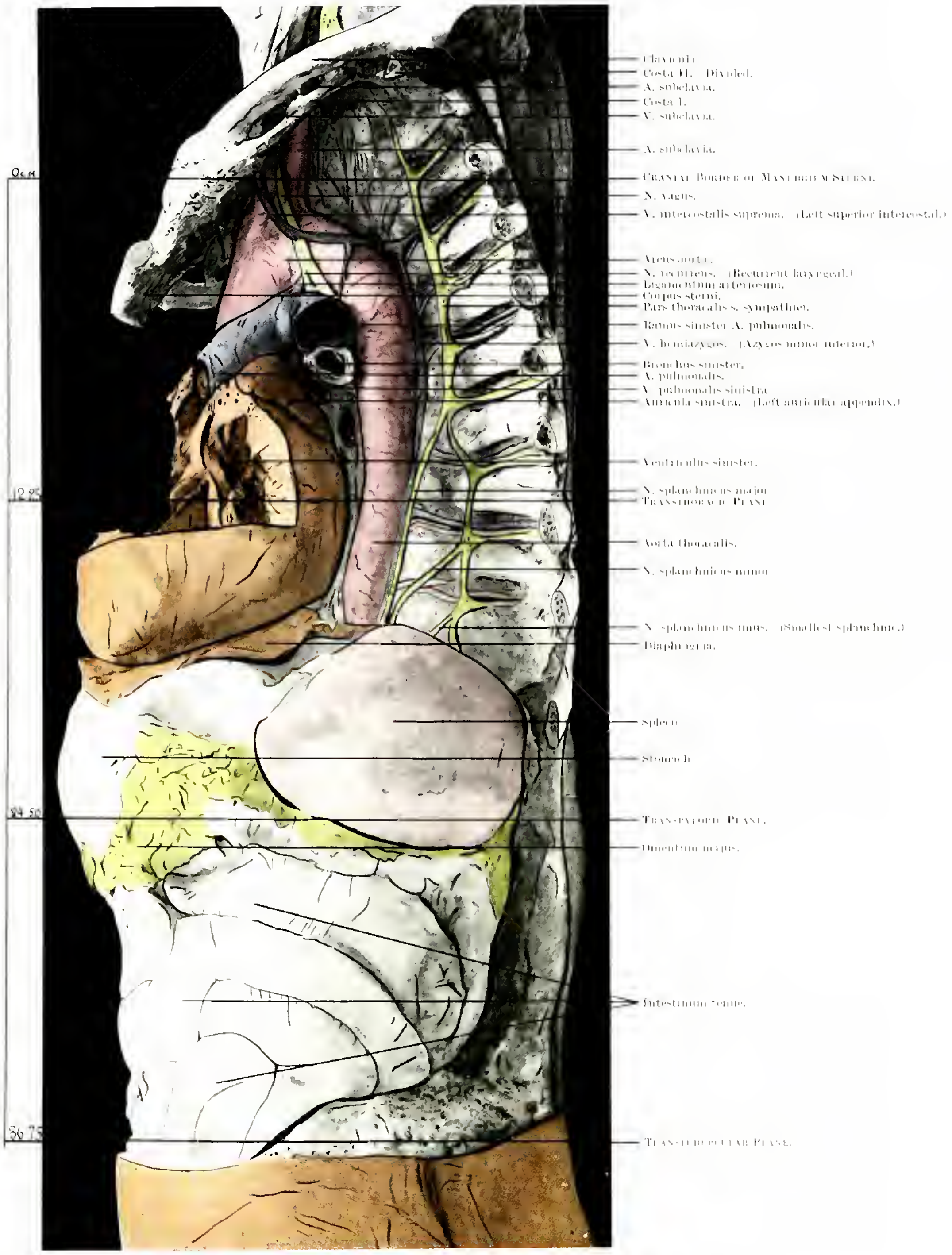
50. Ventral Dissection of the Third Quarter of the Trunk.



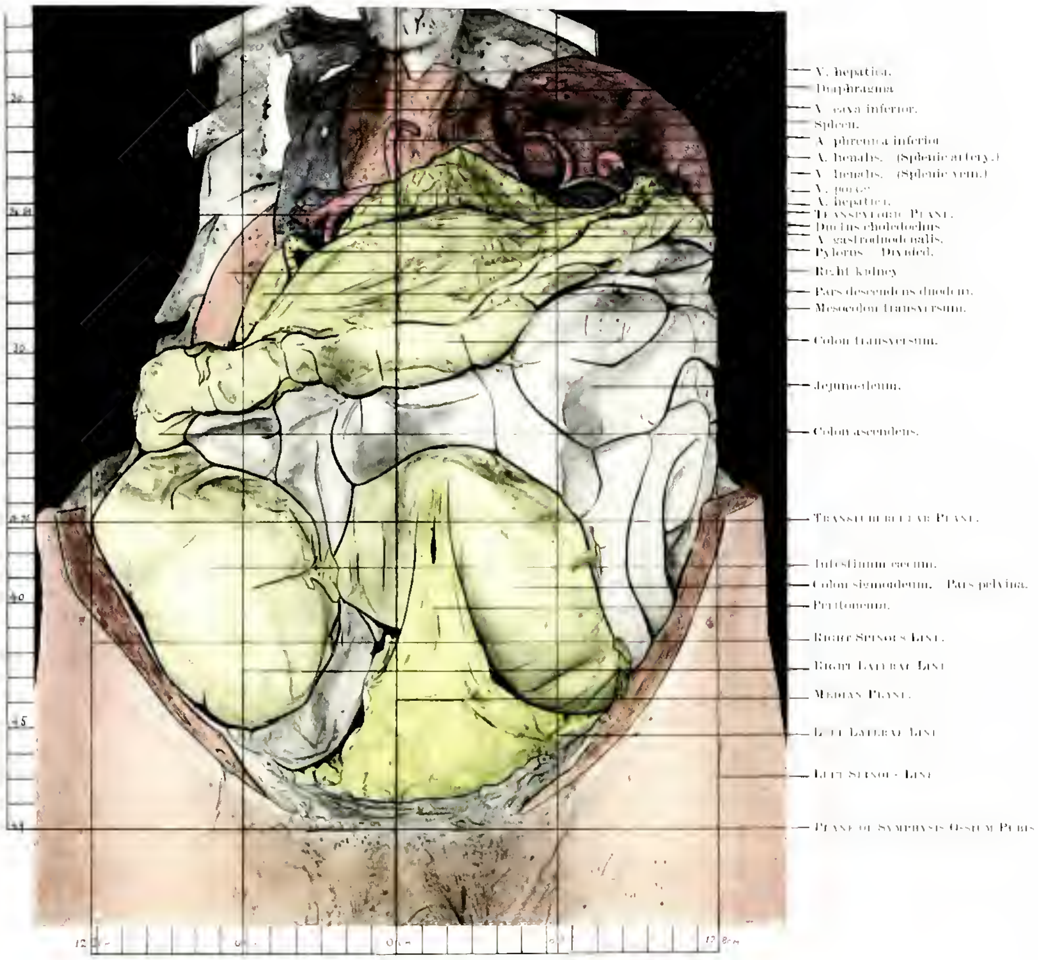
51. Dissection of the Liver Bed after Removal of the Liver viewed from the Right.



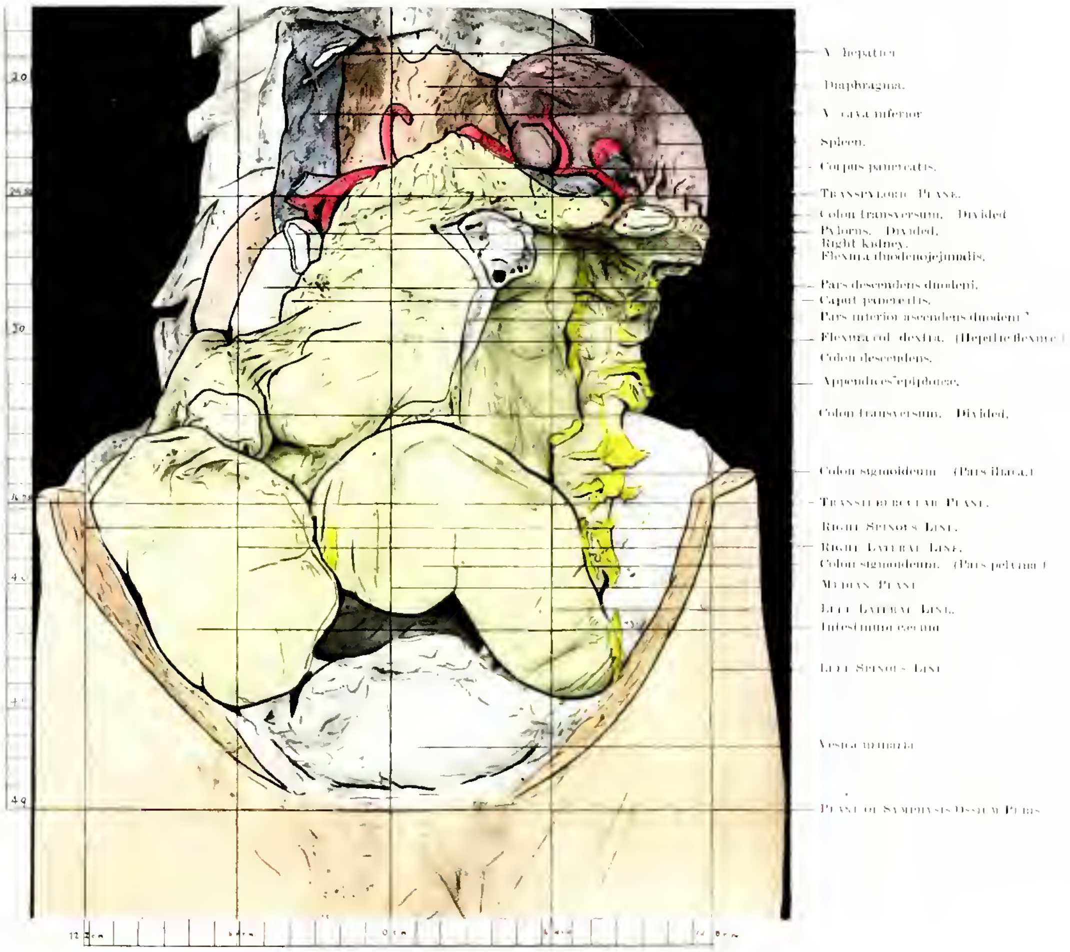
52. Deep Dissection of the Thorax and Superficial Dissection of the Abdomen after removal of the Liver.



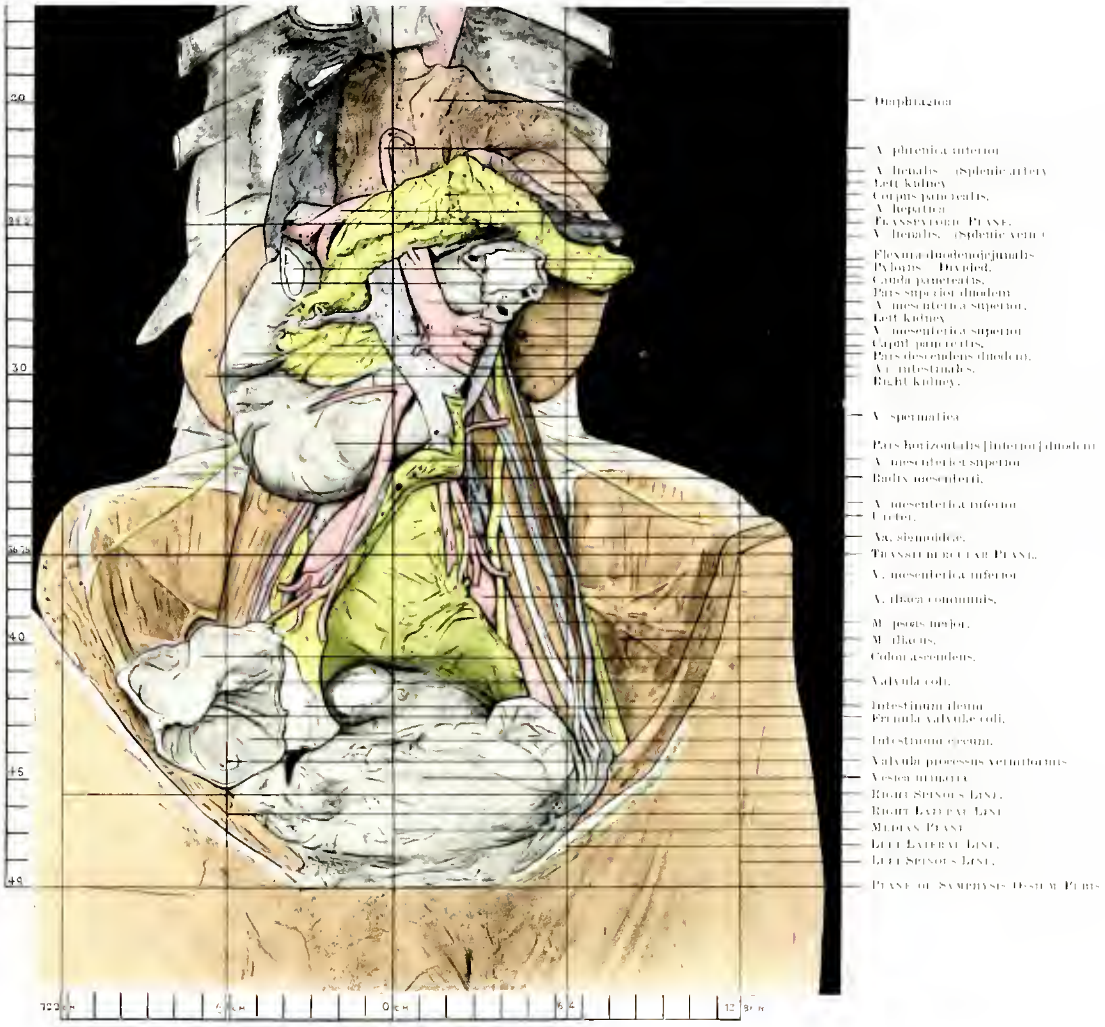
53. DISSECTION OF THE LEFT SIDE OF THE CRANIAL THREE-QUARTERS OF THE TRUNK VIEWED FROM THE LEFT AND SHOWING THE SPLEEN IN SITU.



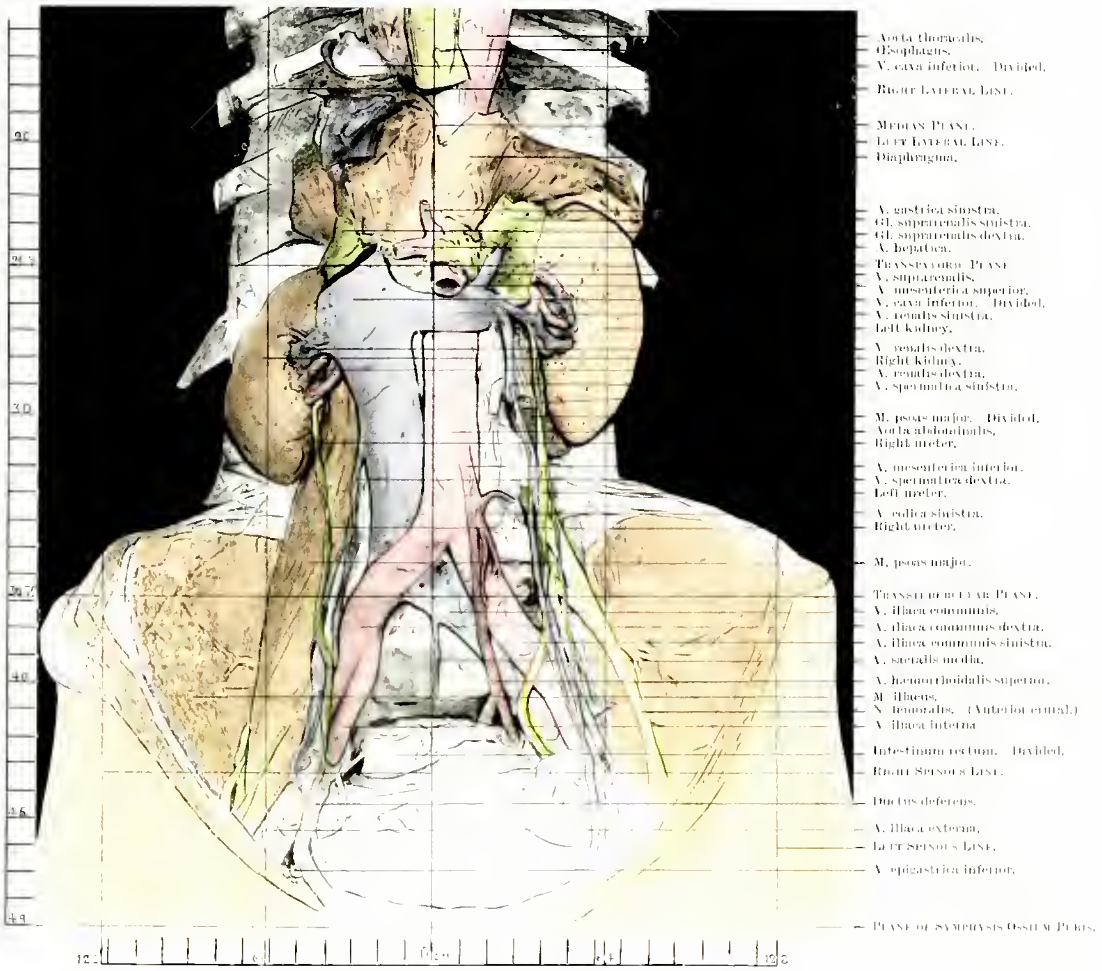
54. VENTRAL DISSECTION OF THE ABDOMEN AFTER REMOVAL OF THE LIVER AND STOMACH.



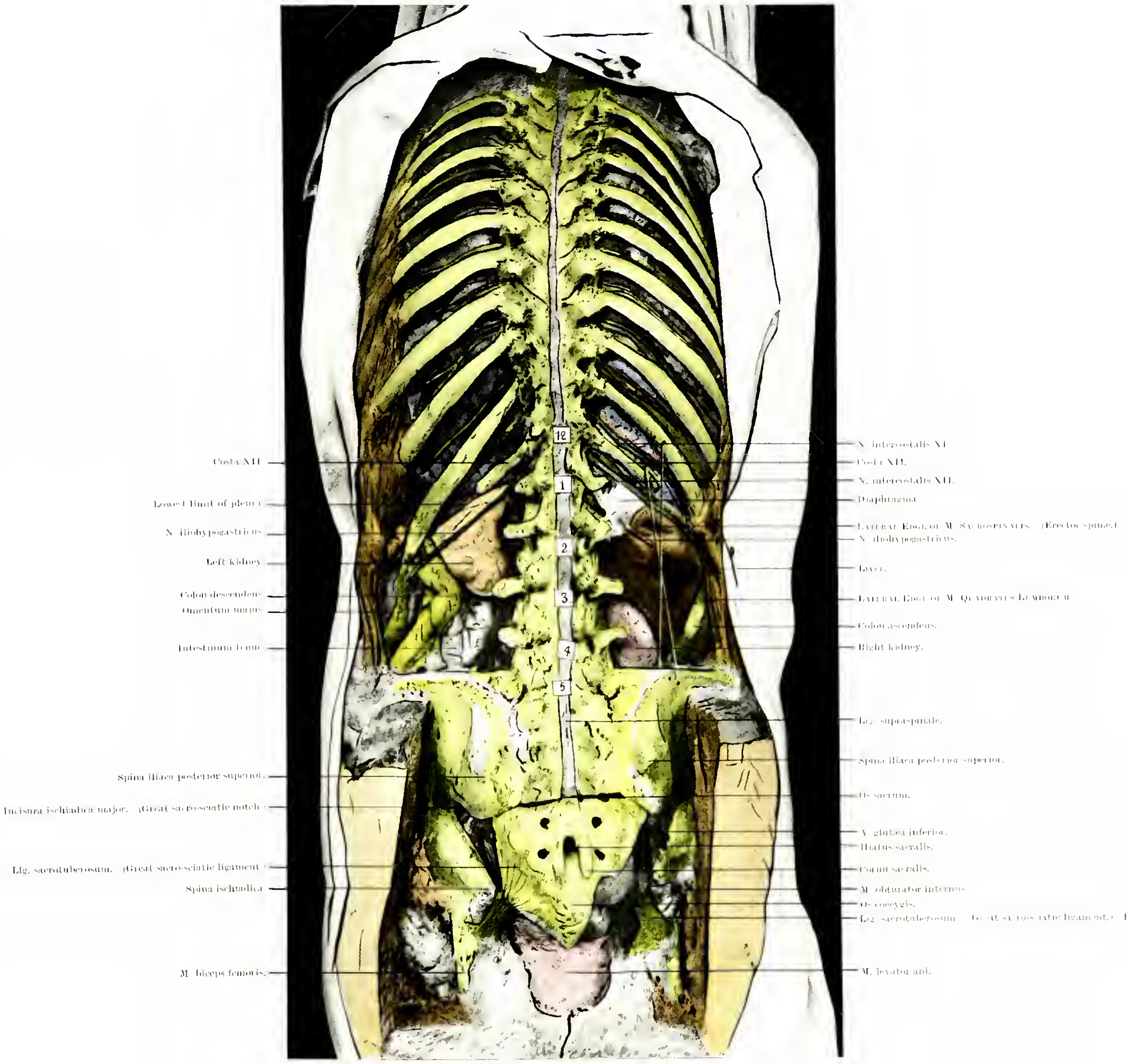
55. Dissection of the Large Intestine after Removal of the Colon Transversum.



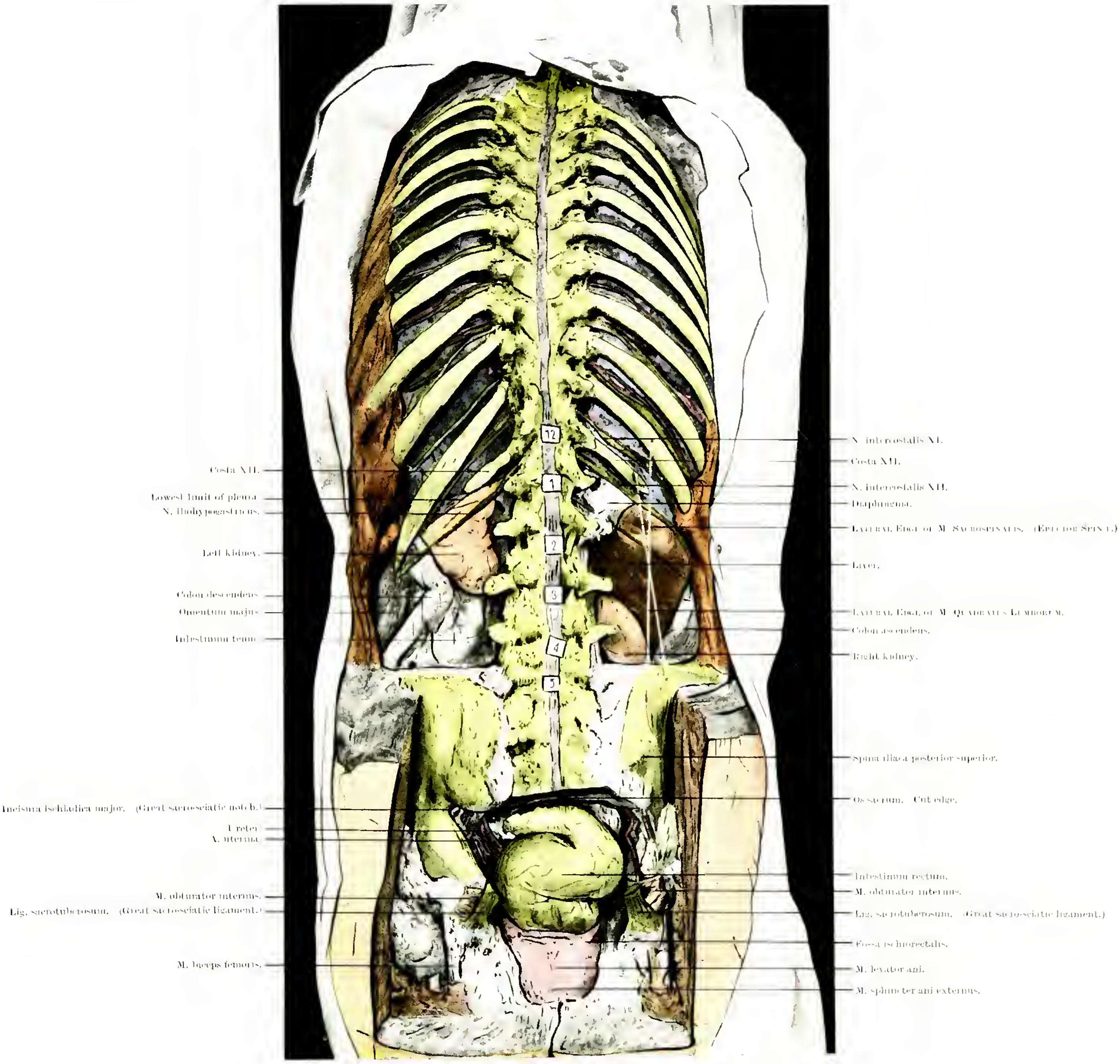
56. Dissection of the Duodenum and Pancreas.



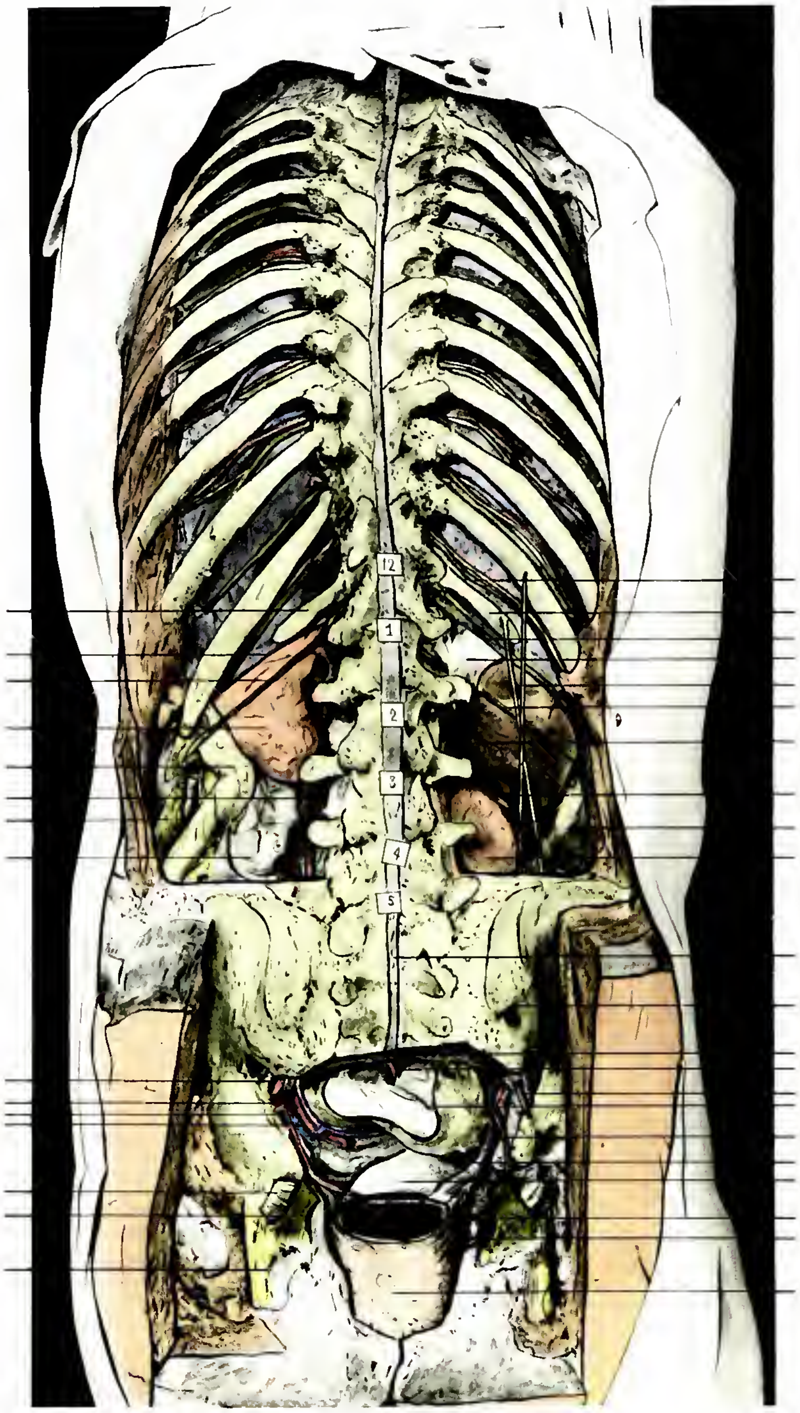
57. Dissection of the Kidneys and Abdominal Blood-Vessels and Nerves.



58. Dissection Number One, Os Sacrum in Situ.



59. Dissection Number Two, Os Sacrum Removed.



60. Dissection Number Three, Intestinum Rectum Removed.